VETERINARY MEDICINE

A Monthly Magazine Devoted to the Promotion of the Art and Science of Veterinary Medicine

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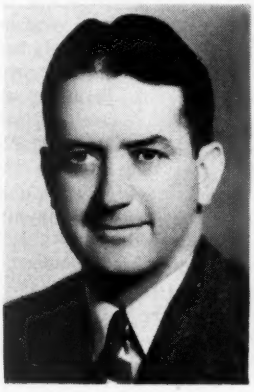
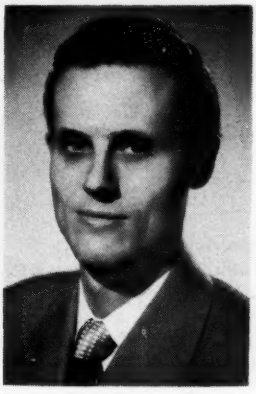
Indiana Veterinary Medical Association Meeting

IN this issue of VETERINARY MEDICINE is reproduced, in so far as practical, all of the scientific program presented at the 66th annual convention of the Indiana Veterinary Medical Association, held in the roof ballroom of the Severin Hotel at Indianapolis on January 12 to 14, 1950. For the sake of brevity, much of the lecture material is presented as notes, which represent detailed abstraction of comments by the various speakers taken during the sessions by a stenotype operator.

Dr. C. Harvey Smith



Dr. Henry A. Lidikay



Dr. G. Robert Oldham

The excellence of the program was attested by the interest manifested by the large attendance and commendation of those responsible, which included Dr. Frank H. Brown, program chairman and his committee, and Dr. W. W. Garverick, secretary. Dr. Henry A. Lidikay, Darlington, who was president at this meeting, discussed in his opening address features of the public relations efforts in Indiana, to which an evening of discussion was given later during the meeting.

President Lidikay expressed his conviction that improvement in favorable relations between veterinary associations, allied professional bodies and groups organized within the industry served by veterinarians, can be expected to bear fruit only after aggressive efforts and exercise of patience. Mrs. C. Harvey Smith, Crown Point, president of the Ladies Auxiliary, also addressed the opening session.

The program arranged for the evening of the first day was given over to the showing of motion pictures. One of these, Local Anesthesia, was prepared by Dr. James E. Green, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn; another depicted activities at the Angell Memorial Hospital, Boston, Mass. Dr. W. W. Armistead delivered the commentary on a film presenting features of intermedullary pinning. Dr. H. E. Jensen, practitioner, Cleveland, Ohio, presented a commentary during the showing of technicolor films, illustrating procedures employed in his practice. These picture lectures were not only enjoyed, but served to impress on those present lessons not easily put into words.

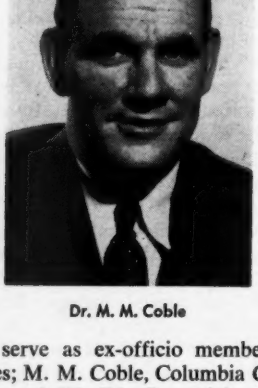
The evening of the second day of a full and fast-moving program was devoted to a discussion of matters pertaining to public relations. At this session Dr. J. T. Burriss, president of the Columbus Serum Company, Columbus, Ohio, and president of the Associated Serum Producers, voiced the generally accepted opinion that the full and forceful effects of good public relations are contingent on the coordinated efforts of all phases of the veterinary profession and not on any segment of the whole, or special groups. Practitioners must accept the responsibility for the most important phase of relations with the public. The sincerity of everyday performances, activity in civic movement, and the confidence and respect built by each individual, are basic public relations. The efforts of groups within the profession have been influential and response shown has benefited individual practitioners everywhere. The work of the A.V.M.A., American Foundation for Animal Health, and state veterinary groups, was cited

as contributing to breaking some barriers, but it was suggested that better coordinated efforts might be expected to be even more effective.

Officers selected at this meeting to serve for the ensuing year were: C. Harvey Smith,

Dr. W. W. Garverick

Crown Point, president; G. Robert Oldham, Kokomo, to the newly created office of president-elect, which will allow the incumbent at least two years' service as a member of the Board of Directors; the president-elect, together with the president and vice-president,



Dr. M. M. Coble

also will serve as ex-officio members of all committees; M. M. Coble, Columbia City, vice-president; and W. W. Garverick, secretary-treasurer.

Changes made at this meeting in selecting the Board of Directors include the provision for ten members or more who will select their own chairman annually. The members of the Board shall consist of a representative elected from each of the ten local or district veterinary associations in the state by the state association to serve a three-year term. Further, each member shall be the local representative on the Public Relations Committee of the I.V.M.A.

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Observations of Brucellosis Control

Notes taken from an address by Dr. Robert Curtis, practitioner, Portage, Wis., presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

The problem of brucellosis control is a daily challenge to the veterinarian; an ever present and vital one. The tears and curses of disappointed farmers, under the best intentioned control programs, are disheartening. Herds formed on a nucleus of carefully selected healthy cattle are found infected because of an unintentional slip which allowed infection to gain entrance. These circumstances create individual problems that require continuous attention and long hours of hard work.

Since 1929, the partnership of which I am a member, has made from 5,000 to 15,000 blood tests annually in dairy cattle herds in Wisconsin. As this work progressed in our territory, the percentage of infected herds was lowered and the number of reactors was lessened. There followed increased demand and better prices for stock for interstate shipment, and sterility problems decreased. With the economic change that came as an aftermath of war, a new situation developed. Livestock movement was accelerated and cattle concentration, especially in heifer-raising areas, increased. In pasture land, heifers from many farms were consolidated in herds. With the violations of care in assembling animals and in measures of isolation, and political factors countenancing the letdown of disease barriers by sanctioning conservation of infected and exposed herds and individuals, and repercussions felt following disbursement of large sums of money in indemnities, features of an effective control program were relaxed.

Now, cattle owners desire brucellosis control and the Wisconsin legislature reacted to demand by enacting a bill which has had the effect of increasing interest in the blood test. The bill provided for test and slaughter and calfhood vaccination or calfhood vaccination alone on a township basis on the expression of the cooperation of 75% of township livestock owners. Response was such that appropriated funds were exhausted before much calfhood vaccination was accomplished. Increased funds

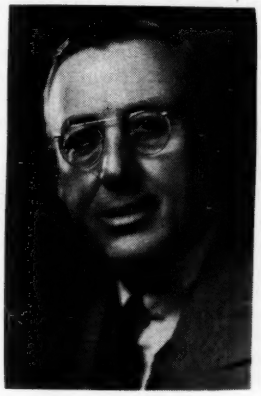
(*Continued on page* 274)

The Treatment Of Retained Fetal Membranes And Their Sequelae In The Bovine*†

W. L. BOYD, D.V.M.,** St. Paul, Minnesota

OF THE various diseases that affect the dairy cow, mastitis is the most important. It is believed that the above statement would be correct concerning all parts of the world, and particularly those countries where the raising of dairy cattle is a major industry. If one were asked to name the second most important disease of cattle, regardless of breed, the answer no doubt, would be brucellosis. Another highly important and common disease affecting the beef cow, as well as the dairy cow, and in which the etiology in many instances is imperfectly understood, is retention of fetal membranes.

The successful treatment and management of this common and highly important pathological condition, including its sequelae, continue to be a riddle to the practicing veterinarian. Particularly is this true in those areas where little or nothing is being done to halt the progress of brucellosis. For fear that the above statement might give the impression that it is believed retention of the fetal membranes occurs only in Brucella-infected cows, it is hastily pointed out that the veterinarian will frequently be called to administer to cows with retained placentas, the animals being not only brucellosis-free, but in herds located in areas that have long been free of the disease. A long time study of brucellosis, infertility, and retained fetal membranes has demonstrated that retention of fetal envelopes is a common symptom of brucellosis, especially in those individuals that abort after pregnancy has advanced to the fifth month or beyond. Also, we fully subscribe to the oft-made statement, that retention of the fetal membranes is a forerunner of infertility or sterility. Retention of the fetal membranes may then occur in brucellosis-free individuals. In fact, the condition may at times occur with sufficient frequency to cause the attending veterinarian some embarrassment, especially where he has assured the owner that once the herd is free of brucellosis, breeding efficiency of the herd will increase, and that the increase will be due in part to the fact that the organism, *Brucella abortus,* has been eliminated, and as a result placentitis will no longer be a common occurrence.



Dr. W. L. Boyd

Placentitis, with retention of the fetal membranes, may be encountered in herds affected with vibriosis; the same may be said of herds in which trichomoniasis has gained a foothold. Then again, it will occur in herds in which no microorganisms can be incriminated. It long has been known that the cow which gives birth to twins will frequently fail to expel her fetal membranes. Such cows do not, as a rule, breed again promptly. Fetal membranes in the cow that calves normally are released on the average, approximately the fourth hour following parturition. These membranes when normally expelled weigh from 12 to 16 pounds. When weighed five or six hours following expulsion, the weight drops to ten pounds or less as a result of dehydration. The largest cotyledons measure about 3x3½ inches. In the nongravid cornu they are 2½x2 inches. There is little or no necrosis of the allantois

*Paper no. 691 Miscellaneous Journal Series, Minnesota Agricultural Experiment Station.

†Presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

**Dean, School of Veterinary Medicine, University of Minnesota, University Farm.

in the apical portion of the gravid cornu. In the nongravid cornu the necrotic area of the allantois may measure 4 or 5 cm. in length.

It long has been known that *Brucella abortus* when attacking its natural host, the bovine, exhibits a very marked predilection for embryonic tissue. After finding its way to the gravid uterus, the organism localizes and multiplies in the placenta areas. The villi of the fetal placenta, as a result of the inflammatory processes, becomes incarcerated within the crypts of the maternal cotyledons. Lesions thus produced, while not pathognomonic, are similar, if not identical, with the changes that have been described in which bacteria, other than Brucella, were involved. However, we wish to point out that such changes have, in our experience, been due mainly to *Brucella abortus*. Necrotic changes involving the placenta, and at times the intercotyledonary spaces, are of common occurrence in retained fetal membranes.

Symptoms of Retained Fetal Membranes

Symptoms of this condition require little or no elaboration. One should not, however, be too complacent about the matter as situations are encountered, at times, which are not recognized and may later be most embarrassing. Retained fetal membranes usually extend or protrude beyond the vulva, attracting the attention of the owner or caretaker. In cases of doubt, the operator should resort to vaginal and, if necessary, uterine exploration. Cattle feeding and management practices are gradually improving, but farms on which the parturient cow does not have the opportunity of devouring the fetal membranes are few in number. Therefore, when in doubt as to diagnosis, do not fail to explore the vaginal canal, and if necessary the uterus.

Treatment

When the fetal membranes are retained for more than ten or 12 hours, it is quite evident that placentitis is present, and the membranes will necessarily have to be removed manually or allowed to remain within the uterus to undergo putrefaction. If this is permitted, then the fetal membranes are expelled as a malodorous mass consisting mainly of fluid, pieces of membranes, and tissue debris. A study involving Brucella-infected cows was made. Animals that had completed what to all appearances seemed to be a normal calving, were examined as early as possible after the completion of parturition. An endeavor was made to procure placental tissues free from secondary invading organisms that as a rule gain entrance to the uterus immediately following completion of calving. In many of the animals great difficulty was experienced in securing a sufficient amount of placental attachments for bacteriologic and pathologic studies. The entire membranes of many of these animals were frequently expelled in four to five hours after parturition. Severe hemorrhages in normal separation of the fetal membranes are only rarely observed in large animals.

Necrosis, either physiological or pathological, is the most common alteration of the bovine placenta. Inflammation, often associated with edema and necrosis, is not only confined to the cotyledons but involves the intercotyledonary areas as well. Calcification of the placenta and the placenta blood vessels is not in such cases uncommon. If inflammation of the placenta is extensive, retention of same usually results. This invites sepsis and results in retarding or stopping involution of the uterus. Involution acts as a barrier to infection, and it is a well established fact that the uterus supplied with normal muscle tone, which then undergoes rapid involution, does not often absorb bacteria or their toxins. Occasionally the fetal membranes may become entirely separated at the cervix and in such instances may drop back into the uterus. This is especially likely if the placenta of the ovarian ends is adherent. Decomposition of retained fetal membranes brought about by the rapid invasion of the uterine cavity by various bacteria, including streptococci, corynebacteria, particularly *Corynebacterium pyogenes*, and at times anaerobic organisms, usually occur within 48 to 72 hours. During the warm summer months putrefaction is rapid and is evidenced by the presence of a reddish brown, malodorus discharge, containing shreds of membranes, occasionally sloughed off cotyledons and tissue debris. Strong, vigorous cows may undergo this ordeal until the entire mass has been expelled, while numerous cows will suffer partial or complete anorexia, elevation of temperature, decreased lactation, mastitis, enteritis, and, not infrequently, metroperitonitis. Study of the literature shows that there is marked difference of opinion among veterinarians as to what constitutes the proper method of treatment. This state of affairs is not confined to the veterinarians of this country, but exists also among veterinarians in foreign lands.

In 1918, Albrechtsen reported that the best treatment for retained placenta was still a question for discussion among the veterinarians of his country. It was his opinion, that most

rational treatment, one that leads to most prompt and complete recovery in the large majority of cases, is removal of the placenta, and this carried out with due consideration for individual cases. Albrechtsen stated that the removal is preferable during the first day when the operation can be performed on a fresh or slightly changed cow and at the time when the uterus has undergone slight contraction. He did not advocate this treatment for those cases in which the placenta was firmly adherent, but advised that the operator wait until the membranes could be taken away with slight traction. Afterwards the uterus should be thoroughly irrigated with large amounts of warm physiological salt solution. Although the statement of Albrechtsen was made more than 30 years ago, a similar statement might be made today with only slight modifications, without fear of great criticism. This thought is expressed only after having given careful consideration to recent advancements in veterinary medical therapy, particularly as related to the sulfonamides and the antibiotic agents which have become an important part of the armamentarium of the general practitioner. We believe that most veterinarians practicing in dairy sections feel as a whole, that the best time to resort to manual removal of the fetal membranes is on or about the 72nd hour following termination of parturition. Whether one should resort to irrigation of the recently gravid uterus of the bovine, is also a debatable question.

Irrigation if utilized, should be done following the removal of the membranes and with the objective, of course, of mechanically freeing the uterus of tissue debris and bacteria rather than depending on antiseptics which might do more harm than good. Employment of uterine capsules containing various drugs has gained great popularity during the past 20 years, but there are veterinarians who still resort to the introduction of a bland oil, such as mineral oil, to which boracic acid or iodoform, or both have been added. If iodoform is used, one must be extremely careful, because of its odor, in using the drug around dairy barns and dairy barn equipment. Use of sulfonamides and other chemicals administered in gelatin capsules have largely, if not entirely, replaced the use of boracic acid and iodoform. Employment of animal charcoal in gelatin capsules inserted deep within the uterus is no longer a common practice. This form of treatment originated from the investigational work of Opperman of Hanover, Germany. For a time this recommendation received wide publicity.

Manual removal of the fetal membranes should not be attempted unless the placenta can be detached without resulting in irritation, pain, or hemorrhage. In those cases where necrosis is extensive with sloughing of the cotyledons and thickening of the chorion, the membranes and tissue debris should be manually removed. Manual removal of all the fetal membranes from cows which have aborted or from cows which have given birth to strong healthy calves is usually impossible.

When the operator spends much time in an effort to remove these tissues, more harm than good is accomplished. Manual removal can usually be performed with greater safety at the end of 72 hours than it can at 48 hours. The operator should wear rubber gloves and sleeves to guard against infection. The infected animals should be placed in isolation and should receive careful consideration until ready to be returned to the breeding herd. In the treatment of retained placenta, it should be remembered at all times that we are confronted with an important pathologic condition, the course of which we must endeavor to modify or check. Hormonal therapy of retained fetal membranes is a favorite with many veterinarians. Results are varied and, of course, difficult to evaluate. Pitocin combined with synthetic estrogens is the form most often recommended.

The synthetic or natural estrogens are given intramuscularly in doses of 30 to 50 mg. After a period of 24 hours, pitocin in doses of 3 to 5 cc. is injected either subcutaneously or intravenously.

The use of sulfonamides and penicillin should not be disregarded. Removal of the fetal membranes, while most valuable, does not terminate the inflammatory process. Uterine irrigation with saline solution or very mild antiseptics, together with gentle massage of the uterus via the rectum, is beneficial in hastening the retarded involution. Generally speaking, we believe that stilbestrol is most advantageous when it is used as a method of completing involution in a structure that lacks sufficient muscle tone to accomplish a complete evacuation. In other words, the writer believes that stilbestrol is most useful when it is given after the membranes have been removed either manually or otherwise. Stimulants and antibiotics are in order as supplementary treatment. Also recommended is the intravenous use of dextrose solutions.

Important Sequelae

Metroperitonitis, pyometritis, and abscess formation with pelvic adhesions, are common sequelae of placentitis. Severe cases of metroperitonitis usually should not be subjected to uterine irrigation or massage. Such animals may be given antibiotics such as penicillin, supplemented by the use of dextrose intravenously. These cases must be given plenty of rest and not subjected to rectal examinations until they have recovered from the acute attack. Animals during the first stages may be given penicillin 800,000 units every 24 hours for a period of three or four days to control infection.

Sulfonamides may also be prescribed. Supportive treatment in which dextrose is given intravenously is important. Following the acute stage one may resort to the administration of estrogens intramuscularly. Later (72 hours) from 2 to 3 cc. of pituitrin may be given. The condition of pyometra, which is a common development, is recognized by making careful vaginal and rectal examinations. Chronic cases have a history of failure to show estrus. Many such cases will discharge a mucopurulent material when recumbent, otherwise they may not show any unnatural vaginal discharges. Vaginal examination often reveals a partially dilated cervix. The opening, however, may be very small, so small, in fact, that one may have some difficulty in passing a rubber horse catheter. By rectal exploration, the uterus may or may not be found to be greatly distended; the structure is usually, though not always, asymmetrical, and possesses poor muscle tonus. The previously gravid cornu is usually elongated. The ovary which contained the persistent corpus luteum of pregnancy, may or may not be difficult to palpate. Success in this respect is dependent upon the distention of the uterus. The ovary when palpable will, as a rule, reveal the presence of a corpus luteum which may or may not project above the surface of the ovary.

Treatment consists first (though it is not absolutely essential) of siphoning off the uterine content through the use of a long (six or seven feet) rubber horse catheter. The corpus luteum then may be removed by pressure exerted by way of the rectum or vagina. The choice in this respect is determined by the size of the corpus luteum and the ease with which it separates from the ovary. Removal of the corpus luteum in long standing cases and when it is small and centrally located should be performed by laparotomy. The uterus usually empties quickly following extirpation of the corpus luteum and involution regularly follows.

Cases that are treated within three to four months following parturition may be considered favorable subjects. Long standing cases, though they may respond to treatment often fail to conceive again. With the development and readily accessible synthetic estrogens, many veterinarians have turned to their employment as a substitute for extirpation of the corpus luteum. Administration of stilbestrol is usually successful and, as a result, certain pitfalls such as an occasional severe and even fatal hemorrhage following manual removal of the corpus luteum, are avoided.

REFERENCE

Albrechtsen, J., The Sterility of Cows; Its Causes and Treatment. English translation by Dr. W. Wehrbein. Chicago, Alexander Eger, 1917.

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Present Day Information on Pullorum Disease

Notes from an address by Dr. B. S. Pomeroy, Division of Veterinary Medicine and Poultry Research, University of Minnesota, St. Paul, presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

Since 1947, 1,150 cultures from 536 outbreaks of pullorum disease in chickens and turkeys have been examined at the laboratories of the University of Minnesota. Of these, 28% were due to a variant type of infection. These results may explain, in part, many outbreaks that have appeared to be failures in the pullorum control program.

Testing procedures with stock antigens may miss identification of 90% of the birds infected with the variant types of pullorum infection. Measures of control must consider this variant type of infection and in problem flocks and hatcheries, test antigens must be used that will pick out carriers of either type so that they may be eliminated from the flock.

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Heartworms*

W. W. ARMISTEAD, D.V.M.,** Columbus, Ohio

TEN OR 15 years ago, the parasite, *Dirofilaria immitis,* was confined mostly to coastal or swampy regions of the United States. Now dogs harboring heartworms are a feature of almost every practice in the country. The increase in incidence and the spread of infection are due to two factors: (a) Transporting of dogs for hunting, breeding, dog shows, and, during the war, the movement of dogs belonging to army personnel, and (b) the fact that practitioners are seeking the parasite in the examination of a large number of dogs.

Of course, some features of its still incompletely understood life cycle also may have contributed to its spread. Mosquitoes are considered to be primary vectors, transferring the infection from dog to dog. It is unlikely that these insects could have been responsible directly for its wide geographical spread during the past ten years.

The average practitioner thinks of the adult heartworm as a threadworm six to ten inches long which inhabits the right ventricle. This is true as far as it goes, but this parasite often is found also in the larger arteries of the lungs and in the posterior vena cava. These adult filariae may live as long as three years and produce larvae called microfilariae which circulate in the blood stream. The parasite is seldom found in puppies; about nine months are required for the appearance of microfilariae after infection.

Many years ago, when the disease was new to veterinary practitioners, a parasitologist from Texas A. and M. College was asked to speak on the subject before a group of practitioners. In order to make his presentation more interesting, he took with him four dogs, the peripheral blood of each containing large numbers of microfilariae. At the meeting he gave a very interesting talk, demonstrated methods of drawing and examining blood samples, and live microfilariae in blood smears from each animal. When the dogs were destroyed and the hearts were opened to demonstrate the adult worms, the hearts of three of the animals did not contain a single adult worm.

In the clinic at Texas A. and M. College, we find frequently a dog known to have microfilariae, which fails to yield a single adult on autopsy. Parasitologists as yet are unable to offer a definite explanation, but several possibilities suggest themselves:

a. The mircofilariae observed are the still-living products of adults which have died of old age. (Sometimes the great number of mircofilariae counted makes this explanation seem improbable.)

b. The larvae observed are not the immature forms of *D. immitis,* but of some other parasite —perhaps hookworm larvae. Any parasitologist can tell the difference between a microfilaria and a hookworm larva. The latter is twice as long and about five times as wide as a microfilaria. A heartworm larva is about the same diameter as a red blood cell. Further, the late Doctor VanVolkenberg[1] assured me that it would be rare indeed to capture a hookworm larva in a blood smear.

c. Some veterinarians who have autopsied heartworm cases after periods of treatment and failed to find adults have decided that the drug administered must have killed off the adults first. Actually, the antimony drugs, used almost exclusively until very recently, are known to be much more lethal for the microfilaria than for the adult.

d. I have even heard the explanation that the microfilariae found on blood examination were all injected by the intermediate host or hosts, none of the larvae having reached maturity by the time of autopsy. The work of Underwood and Harwood[2] serves to eliminate this solution. These workers injected 233,000 microfilariae into a dog. Although the larvae lived over two years, comparatively few of them appeared in the peripheral circulation.

e. Perhaps a more plausible explanation is that the adults were located in some obscure tissue where they would be difficult to find but where they were still able to discharge microfilariae into the blood. Schnelle and Jones[3] reported finding an adult heartworm in the anterior chamber of the eye of a dog at Front

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Royal, Va. A similar occurrence has been reported by Raillet and Henry[4]. In another dog, Schnelle and Jones[6] found an adult female *D. immitis* in an interdigital cyst.

Periodicity of Microfilariae

Another question which has not been settled to the complete satisfaction of all, is that of periodicity of the microfilariae. Some respected workers have found greater numbers of microfilariae at certain hours of the day or night. Others have related the number of circulating microfilariae to rest. Some have found that the number was increased at feeding time. The explanation which seems most plausible is that there is a tendency for mircofilariae to accumulate in some particularly vascular tissues, notably the spleen, from which they are

Adult Dirofilaria immitis in situ

routed occasionally by emotional or nervous stimulation. It can be demonstrated that there is an increase in the number of circulating microfilariae after an injection of epinephrine. This, like the epinephrine released with the excitement of feeding time, must cause the spleen to contract, forcing greater numbers of microfilariae into the circulation. Actually, very little evidence of true periodicity has been found in our clinic.

Another point of importance which may be of interest to this group, is the fact that the number of mircofilariae in the blood sample is no accurate indication of the number of adults present. Nor is it of any help in establishing a prognosis or predicting the necessary duration of treatment.

The common symptoms of heartworm infection are variable. However, there is one clinical symptom which is consistent enough to be of diagnostic help—loss of stamina. Of course, this symptom is difficult to observe in the house pet, but the sporting dog owner usually furnishes the all-important clue, such as: "Doctor, this dog starts out like a house afire, but after a little while he begins to tire and finally just quits and goes back to the car!"

Most of the other symptoms listed by textbooks are inconstant or of no diagnostic value. Emaciation does not always accompany even the advanced cases. Cough is fairly common, but may be due to so many other conditions that it is of little help in making a diagnosis.

I suppose that in Indiana advanced, chronic cases are comparatively rare. In our section they are very common. In south Texas any of the following may suggest heartworm infection to the clinician; ascites, edema of the extremities, moist skin lesions (liver microfilariae may sometimes be recovered from these), epistaxis, hematuria, posterior paralysis.

Blood Examination

There are several ways to examine blood for the presence of microfilariae:

Direct Smear: If a thin smear is made of whole blood, live mircofilariae often may be seen under low power microscopic examination. This smear must be examined quickly, before it clots, as clotting kills the larvae, making them difficult or impossible to see. This method, although quick, is much less reliable than the following methods.

Citrated Blood Sample: After centrifuging a 2 cc. sample of citrated blood, the microfilariae (dead) may be found in the sediment at the bottom of the tube. This method is excellent if the technic is good. There is some chance for error and loss of microfilariae in transferring the tube sediment to a slide.

Whole Blood Sample: If a 2 cc. sample of whole blood is allowed to clot, the microfilariae will wriggle out into the serum. The serum may then be poured onto a slide and the live larvae may be seen unobscured by blood cells or other debris. Microfilariae will live for hours in serum; samples may even be allowed to set over-night. This method, although slower than the others, is probably best of all for the average practitioner.

Treatment

The treatment of heartworm infection is undergoing some changes but there appears to be some limitation to present available therapeutic agents. The old reliable antimony preparations seem to be somehow less reliable than they once were. In addition to the known disadvantages, perhaps the parasite is developing some tolerance. New methods of administration[6,7,8] have improved batting averages with the antimony drugs. The newer arsenical preparations have advantages, but results are difficult to evaluate clinically. All the treatments so far devised have the disadvantage of expensive, prolonged, parenterally administered treatment. To complicate the problem further, incidence of the infection seems to be on the increase and there are no known or practical preventive measures.

Our great need is for a safe, efficient treatment which can be positively evaluated on its completion by the clinician; or perhaps even one which can be administered by the owner to his dog. Until that happy day, more and more veterinarians will be following the lead of those in the so-called heartworm areas and treating only those cases which show serious symptoms and treating those only until the symptoms are controlled.

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During the year that the centennial of the first successful vaccination by Edward Jenner was being celebrated all over the world, an epidemic of smallpox in Gloucester, England, cost hundreds of lives. It was in Gloucestershire that Doctor Jenner practiced and made his momentous discovery. Nevertheless, the town authorities in 1896 were opposed to vaccination.

Practical Management of the Problems Facing the Small Animal Practitioner

Notes taken from an address by Dr. R. E. Ruggles, practitioner, Moline, Ill., presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

One of the foremost problems in management of a small animal clinic and hospital is the maintenance of cleanliness in the entire establishment. Owners of house pets are prone to judge professional efficiency by impressions, comparing the place established for the care of animals with human clinics. Efforts must be continuous to maintain clean rooms and wards free of objectionable odors. Disinfectant solutions having strong odors are to be condemned for use in any part of the veterinary hospital. Free and frequent use of ordinary cleansing preparations are recommended, special attention being given to floors.

A system of permanent records of case histories is essential to good management. Such records assist the clinician in establishing correct diagnosis and prescribing treatment. Embarrassing situations may also be avoided in those instances where questions arise between doctor and owner in all matters regarding the pet that has been a patient.

The problems offered by the patient were discussed, including routine of diagnostic procedures employed by the speaker and hints on methods of treatment that have proved successful. Matters considered included tonsillitis, general dentistry, corneal ulcers, hematoma, otitis, coxofemoral luxation, urinary incontinence, wounds, and prostatitis. Doctor Ruggles emphasized care of the mouth of old dogs and the improvement in general health that follows extraction of infected teeth and control of the infection and inflammation of gums and alveoli in aged dogs.

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Cardiac irregularities of an unusual type were recorded on a phonograph record at New York State Veterinary College, Cornell University, Ithaca, by an ingenious method, employing a stethoscope and tape recorder. Groups of students are thus enabled to study heart sounds made on a permanent record, without disturbing the patient.

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In the last three years schools of medical technology have increased from 337 to 433 and the annual number of graduates from 1,206 to 1,720.

Some New Factors Affecting The Nutrition Of Farm Animals*

W. M. BEESON, B.S., M.S., Ph.D.,** Lafayette, Indiana

NUTRITION plays an important role in keeping livestock healthy and vigorous. For many years, research has been devoted primarily to the study of how certain combinations of feeds affect animals and now through the identification of many specific nutritional factors, our research program is directed toward determining what specific physiological effect these nutrients have on the growth, reproduction and health in farm animals.

The rapid growth of farm animals and the continual change in the vital factors contained in farm feeds have resulted in nutritional deficiencies that did not occur 25 or 30 years ago.

Three important contributions recently made through research should lead to better understanding of how to balance more completely the nutrients required for farm animals. I am going to discuss with you the animal protein factor (APF), rumen nutrition and nutrition of the unborn.

Animal Protein Factor

No subject has attracted more attention in recent months among hog producers, veterinarians, feed manufacturers and experimental workers than the so-called animal protein factor. The term, animal protein factor (APF), has been used to refer to a group of unidentified factors found in or associated with proteins from animal origin, but generally lacking in vegetable protein supplements such as soybean oil meal. The name is misleading because it suggests something of protein nature; actually this is not the case. When we speak of APF, it refers to vitamin-like factors. One of the important components has been chemically identified and named vitamin B_{12}. Evidence today indicates rather strongly that B_{12} is only one part of the complex and there are many other vitamin-like factors contained in APF supplements.

For years hog diets have been supplemented with animal proteins which have been supplying varying amounts of this factor. Too often many people feel that when a new factor like APF is discovered that "we have arrived!" They think, "This is it," that we have solved all the problems of swine nutrition. To me, it shows how little we actually know. This is only one link in the long chain of new nutrients which are gradually being revealed as necessary for growth, fattening and reproduction.

All the foods and feeds containing APF have not been identified. Some of the foods which have been shown to contain this factor in varying amounts are milk products, liver, meat products, fish meals, condensed fish solubles, egg yolk, cow manure and many concentrates which are synthesized by microorganisms such as molds and bacteria. Most of the commercial APF concentrates are synthesized by organisms from waste products, from streptomycin and aureomycin. Many new products are coming on the market each day which contain APF activity.

It has been shown that the billions of microorganisms living in the rumen synthesize vitamin B_{12} and probably other components. Undoubtedly the good growth and the healthy condition of hogs following cattle is not only due to the corn obtained from the droppings, but many other unknown nutritional factors. Extracts of cow manure fed to chicks have given a growth stimulus parallel to the response obtained from feeding vitamin B_{12}.

Two experiments conducted at Purdue University have shown definitely that the addition of an APF supplement at a level ranging from 1 to 2 mg. of B_{12} activity per 100 pounds of feed resulted in a stimulation in growth rate. When weanling pigs were confined to dry lot on a basal ration consisting of corn, soybean oil meal, minerals and vitamins A and D, the pigs receiving the APF concentrate were on an average 44 pounds heavier at the same age than the control pigs. In the second experiment conducted with the same all-plant ration in dry lot, the pigs receiving the supplement were on an average 52 pounds

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heavier at the same age than the control pigs without APF. Outward symptoms of APF deficiency were characterized in certain pigs by rapid breathing, lack of pep and a general anemia. The blood picture showed severe reduction in hemoglobin and red cell count.

Rumen Nutrition

It has been observed by veterinarians, livestock men and research workers that an active and normal functioning rumen is essential for the health of cattle and sheep. Today a new concept is being developed in the feeding of cattle and sheep which is based on evidence that in order to properly feed ruminants, a ration must be designed to contain adequate nutrients to nourish properly the billions of bacteria and other microorganisms in the rumen, which break down and synthesize important nutrients for cattle and sheep. Recent research at the Ohio Experiment Station has shown that the rumen contents of cattle have approximately 52 billion bacteria per gram on dry winter feed while the same cattle on pasture during the summer have 96 billion bacteria per gram. Similar results have been reported for sheep. It appears then, that fundamentally our problem in feeding cattle is to design a ration that will maintain the microorganic population of the rumen so that these billions of bacteria can work for the cattle and sheep and break down indigestible products such as cellulose into a digestible form. This approach will allow the use of many poor roughages such as corncobs, soybean straw, corn stover and cereal straws for the feeding of cattle. Rations must be designed to meet the requirements of both the microorganisms and the cattle.

Corncobs have been considered for many years a waste product which is rather low in feeding value. Through the years cobs have been used for many purposes in the conduct of animal and human life and now a large percentage of the cobs that are produced in the Corn Belt are being destroyed by fire or thrown out to rot. In the state of Indiana we produce, on the average, a million and a half tons of cobs annually—an amount sufficient to winter 1,000,000 head of cattle. Potentially, cobs have a feeding value which approaches the value of hay from the standpoint of energy, but this energy contained in cobs cannot be utilized by cattle or any other ruminant unless the cobs are properly fortified with certain nutrients so that the billions of bacteria and other microorganisms in the rumen can break the cobs down into a usable form. Research at Purdue University has shown that if ground cobs are properly fortified with a protein supplement, molasses, minerals, and a vitamin A concentrate, a ration of this type will support a growth rate ranging from 1 to 1.3 pounds daily per steer. At the present time, six lots of feeder cattle are being wintered on corncobs combined with different nutrients such as molasses feed, soybean oil meal, urea, distillers solubles, yeast and alfalfa meal, in order to find out how to improve the utilization of cobs for growing cattle during the winter.

Nutrition of the Unborn

In the past, it has been assumed that the most critical period in the life cycle of animals is from birth to weaning. Many have claimed that the first few days of life are most critical. It appears to me the most important and critical nutritional period of an animal is during fetal development. If death losses of newborn are to be curbed, more attention must be given to supplying all the nutrients that are required for complete development of the unborn. A pig, a lamb, a calf, a foal, that is well born and nutritionally healthy, seldom dies. It is usually the weak, the undernourished and undeveloped at birth that struggle for life and existence.

Life begins when the sperm pierces the ovum. This is when the nutritional demand for balanced nutrients and proper nourishment for life development starts. Although there are many causes for death losses in newborn, research records show that one of the most important factors is the properly balanced diet for animals during pregnancy. As yet, man has not been able to devise a completely purified diet which supplies all the known nutrients for nutrition of the fetus.

For every 1,000 human babies born, only about 20 die in the first year. Of every 1,000 pigs born, 333 die in the first eight weeks of life. Of every 100 calves born, only 70 to 80 live to weaning age. Data presented by Michigan workers have shown that of 483 lambs dropped, 138 or 28.6% died before reaching two months of age. About 71% of the deaths occurred in the first two weeks.

Research at Purdue University for the past five years, involving detailed pathological examinations of over a thousand newborn pigs, has shown rather conclusively that pathological changes developed in the pigs during embryonic life and not after they were born. More pigs starve to death through lack of adequate nutrients prior to birth rather than after birth. It appears that many of the death losses in newborn pigs are due to the lack of some nu-

tritional factor or factors necessary for the development of the pig during embryonic life.

When a corn and soybean-oil-meal ration combined with minerals and cod liver oil was fed to pregnant gilts in dry lot, they weaned only 40% of their pigs with an average of three pigs weaned per gilt. When gilts of similar breeding were fed on the same ration fortified with either 15% of high quality dehydrated alfalfa meal or green alfalfa pasture, the gilts weaned from 80 to 84% of the pigs farrowed and averaged from 7 to 7.5 pigs weaned per gilt.

It is of more than passing interest that alfalfa meals do not always contain the factors necessary for normal development of the unborn. Last year (1949) gilts receiving 15% of alfalfa meal weaned only 49% of their pigs. Apparently curing, processing and storage of alfalfa causes loss of some of these nutritional factors because in all years good farrowing and weaning results have been obtained when gilts were fed on alfalfa pasture during the fall and winter gestation period. Green pastures contain nutrients that are not contained in dry lot rations. As yet man has not been able to put in the feed bag all the supplementary nutrients furnished by the same ingredients plus lush green pasture. Green pastures are the symbol of life and health in the plant kingdom and green pastures are also the symbol of well-balanced rations for farm livestock.

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Antibiotics as Poultry Feedstuffs

A number of investigators have found that chickens, turkeys, and swine grow faster when their feeds contain one of the several newer antibiotics. How these antibiotics act to stimulate growth is not known, but at least two possible mechanisms have been suggested: (1) The antibiotics may reduce the numbers of microorganisms in the intestinal tract, thus sparing for the animal itself more of the feed nutrients; or (2) some breakdown products of antibiotics may provide vitamin-like nutrients which promote rapid growth.

Foreseeing the possible widespread use of antibiotics in the poultry industry, a conference of University of California and California State Department of Agriculture scientists recently met to discuss some of the implications of using antibiotics in feeds. The participants included bacteriologists, geneticists, nutritionists, pharmacologists, and poultrymen.

It was the consensus of this group that as yet there is insufficient information concerning the use of antibiotics to justify a general recommendation of their use as feedstuffs. Too little is known concerning their action to rule out certain potential hazards to the poultry industry. It was agreed that if these agents are responsible in themselves for the observed growth effect simply by reducing the numbers of competing microorganisms in the intestinal tract, it is possible that resistant microorganisms may in time develop and thus nullify the effect of the supplement. One can only speculate whether such resistant microorganisms would be more or less harmful to the bird than are the microorganisms now common.

It is also possible that the meat or eggs from birds so fed might contain these antibiotics in amounts sufficient to reduce the usefulness of these agents in the treatment of human diseases. Inasmuch as the antibiotics are rapidly excreted and are unstable in solution, this seems unlikely; nevertheless, the problem warrants investigation by public health officials.

If some breakdown products provide vitamin-like nutrients which promote rapid growth, the antibiotics might be treated to destroy their bacteria-killing activity, yet retain their growth activity. Such treatment would eliminate the difficulties just mentioned.

Extensive trials are now in progress at experiment stations and commercial laboratories throughout the country. The results of these and future investigations will ultimately resolve the problems discussed above, but until more information becomes available caution should be exercised in using antibiotics in poultry feeds.

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In an experiment to determine if *Trichomonas gallinae*, which causes infection of the upper digestive tract of pigeons and other birds, can reach the liver by other means than via the duodenum and bile ducts, Jaquette (*Poul. Sci.*, 29:157, 1950) performed an esophagotomy on 12 Trichomonas-free pigeons and then fed them with virulent cultures of the parasites. Five of the 12 pigeons developed liver lesions in which the trichomonads were demonstrated. The results indicate that the parasites may reach the liver by a route other than the alimentary canal and bile ducts, but the route was not determined.

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Lush green pasture is a symbol of life, and healthy and efficient livestock.—*W. M. Beeson, Ph.D.*

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Adequate nutrition reduces susceptibility to disease.

Infectious Diseases Of Young Pigs*

L. M. HUTCHINGS, B.S., D.V.M., M.S., Lafayette, Indiana

IMPORTANT infectious diseases of young pigs include hog cholera, swine dysentery, brucellosis, dystrophic rhinitis, and the various members of the enteric complex.

Infectious, transmissible gastroenteritis is a disease manifested by lesions of the digestive tract, which can be reproduced. The etiological agent is filtrable. Baby pig mortality resulting from this disease is of considerable importance in Indiana. In sporadic outbreaks in swine droves, losses up to 100% of pigs farrowed are recorded. The incidence appears to be increasing. In older animals, the disease causes a transient diarrhea, followed by dehydration and loss of weight. Prompt recoveries usually occur in shoats and sows without treatment within three to five days.

Differentiating diagnostic features of this disease in suckling pigs are the occurrence of vomiting and the character of the diarrhea, which resembles partially curdled milk. Spread among young animals of a herd is rapid.

Postmortem lesions include enlargement of the intestinal tract, with an apparent atony of the wall. Contents are fluid. Frequently severe inflammation may be noted in the stomach and small gut, but is not a constant finding. These inflammatory areas are superficial and there appears to be no associated free bleeding nor necrosis of intestinal mucosa.

Laboratory studies have shown the transmissibility of the causative agent by feeding ground infected tissue or filtrates from such material. The disease can also be transmitted by parenteral injection of untreated dilutions of the filtrates. When heated or incubated with phenol, filtrates are not infective; evidence that the agent is either a virus or other type of filtrable infectious agent.

Attempts to treat pigs showing symptoms have failed. Control by moving sows yet to farrow from central facilities to distant clean ground or quarters is recommended. The disease does not appear to be carried over in the breeding herd to much extent and evidence is available that sows may develop some immune bodies that will assist in protecting subsequent litters.

*Notes taken from an address presented at the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

Dystrophic Rhinitis

Dystrophic rhinitis is not the same condition formerly referred to as bull nose. Differential diagnosis is necessary. Early symptoms of sneezing and coughing, subsequently followed by sneezing spasm with nasal hemorrhage, are diagnostic. Following this stage, a twisting of the snout is observed due to a partial to complete dissolution by necrosis, of the nasal turbinate. The syndrome often is accompanied by evidence of lung lesions which develop as a result of the inhalation of bits of gangrenous turbinates. The seriousness of dystrophic rhinitis lies not in resulting death losses, but in the unthriftiness of affected swine and failure in growth or gains in weight even under diligent treatment and provision for an adequate diet.

The etiological agent responsible for this condition appears to be virus in nature. It is filter-passing and transmissible. The infectious agent is carried over from season to season in breeding herds. Lesions on autopsy consist primarily of a chronic inflammation of the nasal mucosa with more or less destruction of the turbinate bones and the accumulation of bloody, purulent exudates in the nasal and paranasal cavities. These lesions are contrasted with those of bull nose, which is characterized by the presence of granulomatous swellings without distortion other than result from such swelling.

No satisfactory treatment can be recommended. Control by depopulation of swine herds and re-entry with disease-free breeding stock is recommended.

Swine Dysentery

Swine dysentery is an infectious disease affecting particularly the cecum and colon. The differentiation of this disease entity from others affecting all or portions of the digestive tract, has been an important step toward proper understanding and treatment of affected swine.

Though shown to be infectious, considerable experimental evidence is available that organisms commonly cultured from affected animals play only a secondary role in etiology. On the

other hand, a Vibrio is commonly associated with the disease symptoms.

Difficulties of a technical nature in isolating and propagating this microorganism make it difficult to assess with accuracy its relationship to the disease. The prominent symptom that has suggested the common names of the disease is a familar copious bloody diarrhea.

Aureomycin and streptomycin were employed for treatment during a recent outbreak in experimental animals. Some promise was indicated and losses were reduced in this trial. Symptoms were relieved promptly, but recurred unless treatment was continued for several days.

One of the most important findings in our studies of brucellosis in swine is the inaccuracy in selecting individuals on the basis of the agglutination test. Though somewhat disappointing, blood tests do offer assistance as a diagnostic procedure for herds in which Brucella infection is suspected. Dependence cannot be placed on a single test of a breeding animal of unknown origin. Nevertheless, every effort must be made to control any and all disease factors that might interfere with the production of a satisfactory pig crop in Indiana. It follows, therefore, that until improved means are available to us, the study of the results of agglutination test series will assist in condemning infected animals of our breeding herds.

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Observations of Brucellosis Control

(*Continued from page* 262)

were then appropriated by the state legislature.

Further regulations prohibit paying indemnity on any reactor in a herd if any additions have been made without a clean test within 30 days prior to purchase, and, that indemnity is forfeited if the individual additions are not isolated and retested within 15 to 30 days following purchase. These regulations are specific and most owners and dealers make a sincere effort to conform, but because of the many and varied sources of infection and incompletely understood features of pathology and present faulty methods of determining infected individuals that may be the source of infection, our eradication program is slowed down by lack of support. Understandable as it may be, further advances must be made in methods of control to gain full confidence of livestock owners. The familiar example of variation in results from a group of samples tested against different antigens is not a confidence-building matter. Neither is there good explanation of the variation from positive to negative reaction within a period of 30 days.

Brucellosis Vaccination

Calfhood vaccination alone will not clean up brucellosis. Immunity developed by vaccination with strain 19, fails to protect heifers against virulent infection. The limitations in its use, short-lasting immunity of low titre, prompts our recommendation that vaccinated heifers be protected from massive exposure. Field experience has taught that vaccinated second or third-calf heifers may develop high blood titre and often abort.

Adult vaccination has been of no great value except in isolated instances. So far as my personal experience extends, its use does not affect the course of the disease.

Summary

Control of brucellosis, like bovine tuberculosis, can best be accomplished by test and slaughter, effectively eradicating the disease from our herds. With the application given the tuberculosis program, success would more likely be assured. The increase in the incidence of brucellosis in man and the impetus given the disease from a public health aspect, will result in further uniformity in regulation, and stimulate research on improved methods of control to the benefit of the livestock industry. Veterinarians are encouraged to aid in area control in every possible manner. Such sincere attitude will tend to discourage the efforts of those now active in driving a wedge between practitioners and the people they serve.

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Newly found Peruvian records, dating back to about 1,000 A.D., indicate that the native turkey was regarded as a source of wealth and a unit of trade. A father advised his son to go into the turkey business because he would always have meat and eggs for food, feathers for cloaks, skin for sandals, and the birds, which grow in number yearly, with which to purchase the products of other men.—*Turkey World, Sept.* 1949.

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No single effort nor program, including public relations efforts, has added more to the prestige of the veterinary profession than the accomplishments in bovine tuberculosis eradication.—*A. K. Cutler, D.V.M.*

Differential Diagnosis of Troublesome Sheep Diseases*

FRANK THORP, Jr., D.V.M., East Lansing, Michigan

FOUR diseases of sheep that present problems of differential diagnosis include pneumonia, enterotoxemia (overeating disease), ketosis (pregnancy disease), and listeriosis.

Pneumonia occurs in breeding flocks as a sporadic condition. Up to 10% of ewes in Michigan flocks may be affected during the breeding season. Ordinarily only a few animals are affected at any given time. It has not been observed as an epizootic. Differentiating characteristics are dyspnea of an abdominal type, elevation of temperature, nasal discharge, and anorexia.

Sulfonamide drugs and the antibiotics effectively control the infection if treatment is initiated early in the course of the disease. A feature of the condition not now well understood is the observation that the lambs of ewes who have recovered, develop pneumonia. In these, mortality is high. The causative agent appears to be carried over in the flock from year to year. Herdsmen are advised to cull affected ewes as early as practical.

Enterotoxemia, or overeating disease, is no respecter of age. In the speaker's experience, three-week-old lambs and ewes ten years of age may be affected. Few have seen animals exhibiting symptoms of this disease because of the suddenness of the onset, collapse and apoplectic-like death. Affected sheep have the head drawn back or may exhibit symptoms of depression, with the head down in a corner or pressing against some fixed object. When such animals go down, the head is drawn back and legs go through a series of running motions. Evidence of these running movements is a telltale sign.

Primary postmortem lesions of enterotoxemia are the hemorrhages observed throughout the carcass. These occur in the abdominal wall as blotchy hemorrhagic areas on the peritoneum, intestinal serosa and diaphragm. Excessive fluid is noted in both the peritoneal and pleural cavities. In feeder lambs or adults, quantities of grain are observed in the rumen and undigested food in the intestine. First losses should be a warning sign, especially if diarrhea is observed in the lot.

In summary, it may be stated that enterotoxemia is a nutritional disease with a concurrent bacterial infection. Vaccination of feeder lambs, where steady weight gains are desired, is recommended. Management alone should suffice for the control of the condition in breeding flocks.

Ketosis, pregnancy disease, lambing paralysis, toxemia of pregnancy, or the half-dozen other names that have been applied to this syndrome in ewes, is strictly a nutritional disease. If digestible carbohydrates were supplied in optimum quantity during gestation, which would provide for slight weight gains beyond those resulting from pregnancy, ketosis theoretically would not develop. Care and judgment of the caretaker or feeder are essential to control.

Differentiating symptoms of ketosis include an increased respiratory rate without elevation of temperature during late pregnancy. However, the disease may occur in non-pregnant animals.

Most affected animals show a characteristic gait that is shortened and appears to affect the ability to raise the hind legs. Apprehension is an early symptom, which is followed by paralysis. Later, affected sheep grind their teeth, show a variety of nervous symptoms, become comatose and die in convulsions.

On autopsy of animals either destroyed in later stages of the disease or that have died, areas of fat necrosis may be observed. Body lymph glands are atrophied, color changes to yellowish are observed in the liver, kidneys and adrenal glands.

Glucose therapy in early stages is followed by prompt relief of symptoms. Supplementary feeding of molasses is recommended. Care must be exercised in returning recovered animals to full feed.

A movie strip was shown of sheep exhibiting symptoms of listeriosis, or circling disease. The speaker's running comments while pictures were shown illustrated characteristics of the infections. Animals ofttime walk in circles, turning in only one direction for several hours. The head is usually held to one side. Later a twitching movement of the head and a nystagmus are rather constant differentiating features. The disease is of short duration, extend-

*Notes taken from an address presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

ing over a period of 24 to 36 hours; rarely as long as 48 hours. Disease manifestations are invariably followed by death.

Gross postmortem lesions in adults are few and, except for a marked congestion of the small intestine, are not striking. Bacteriological culture of the brain lesions of necrosis confirm the diagnosis of listeriosis. In lambs, a bacteremia is present with abscesses developing in the liver and lungs.

In their order of importance in Michigan breeding flocks, the four diseases discussed in the foregoing may be listed as ketosis, listeriosis, pneumonia and enterotoxemia. In the feed lots, overeating is of first importance. Approximately 80% of sheep losses are the direct result of treatment with vermifuges or are due to nutritional factors or mismanagement. Only 20% are due to infectious diseases.

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Dystocia in the Sow

Notes taken from an address by Lee T. Railsback, B.S., D.V.M., practitioner, Ellsworth, Minn., presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

Swine obstetrics is similar to most of the problems referred to veterinarians; each presents features not duplicated in others. These variations dictate the use of a variety of methods, equipment and material. Ingenuity and a reasonable analysis of the situation will be rewarded in successful delivery of pigs and conservation of the parturient sow.

It is recommended that those items useful in handling dystocia be carried as a complete group in one case. This practice has proved convenient and time-saving. Instruments found most expedient include a Knowles uterine forceps, sharp obstetrical hook, cable obstetrical snare, chains, rubber catheter, forceps, scissors, and other miscellaneous small items. Drugs included in the kit are posterior pituitary extract, stilbestrol, penicillin, a powder lubricant, antiseptic solution, and others.

Examination

Restless sows are first restrained in left lateral recumbency by looping one end of a short obstetrical chain around the left metacarpal region and securing the other end above the left hock.

After washing up, the veterinarian applies an antiseptic lubricant powder to his left hand and arm, and the vagina is examined for evidence of assistance that might have been given or for lacerations. The client should be informed and, if possible, shown the damage before making further and deeper examination. If examination indicates that the birth canal is clear, the intramuscular injection of 3 to 5 cc. of posterior pituitary solution is given almost routinely. Care must be exercised that this material is deposited deep into muscular tissue. Further preliminary steps include giving an enema in those cases of extreme constipation. If the bladder is distended, it is advisable to catheterize.

Methods of Delivery

With failure of proper dilation or, in instances where a large fetus in anterior presentation becomes lodged in the pelvic cavity, delivery is accomplished by grasping the upper jaw with the Knowles forceps and applying traction. If the fetus is living, the forceps should not be locked but only enough pressure applied to the handles to prevent the jaws from slipping. Where more traction is desired to remove a dead fetus, the instrument can be thrust deeper over the snout and clamped. If still more traction is needed, the hook is passed to a point posterior to the scapula and even traction applied to both forceps and hook. A pint or more of mineral oil serves as a lubricant when the vagina is dry. When the pig is anterior to the pelvic rim, the hook can be inserted carefully along the finger to guide and fasten it into the dorsal snout, finally grasping with the forceps as soon as it can be applied. In still other of these cases, the snare can be passed over the pig's head and the fetus guided through the birth canal.

The ventral floor of the vagina may be lacerated, either by early careless midwifery or, as sometimes happens, by the canine teeth of pigs during normal birth. These lacerations should be sutured carefully after all have been delivered. Treatment at four-hour intervals by douching with an oil suspension of sulfathiazole for three or four days is recommended. A prophylactic dose of 1,000,000 units of penicillin in oil also has aided prompt recovery.

Intravenous injection of posterior pituitary extract is most dependable to relieve uterine inertia. Response is prompt and positive, and only infrequently need be repeated. Calcium gluconate administration in these cases has not given the results claimed for its use in dystocia.

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USDA reports that one-third of the 1949 wheat crop in the United States was supplied by Kansas, North Dakota, and Texas; largest quantities by states in the order named.

Sulfonamides In Poultry Diseases*

B. S. POMEROY, D.V.M., M.S., Ph.D.,** St. Paul, Minnesota

DURING the past few years, the sulfonamides have received clinical trial in a wide variety of infectious diseases of poultry. The accumulated knowledge of the past ten years on this use of these drugs permits a rational approach to the employment of the various sulfonamides. Their development and that of antibiotic agents such as penicillin, streptomycin, aureomycin, and other chemotherapeutic agents, have drastically changed the methods of controlling certain poultry diseases. At the same time the ever-increasing need of the poultry industry for veterinary services continues, and this demand can only be supplied by the local practicing veterinarian, who must realize that this industry has grown and has become an important branch of agriculture.

The use and effectiveness of the sulfonamides are dependent on an accurate diagnosis, and with more effective and more convenient drugs available this need becomes more apparent. The economic benefits to the poultry industry through sulfonamide therapy have been significant and promise to be greatly extended.

The Sulfonamides Commonly Used in Poultry Practice

Although hundreds of sulfonamides have been developed by the chemist, only a few have been found applicable for poultry diseases.

They differ widely as to certain biochemical properties which determine their therapeutic effectiveness, such as absorption, distribution in the animal body, and excretion. The choice of drug and dosage is dependent upon the disease that is being treated.

The common sulfonamide drugs are:

sulfanilamide	sulfathiazole
sulfaquinoxaline	sulfamethazine
sulfaguanidine	sulfadiazine
sulfamerazine	

Administration

Sulfonamides are usually administered orally, either mixed with feed or as the sodium salt which may be dissolved in the drinking water, or as a prepared solution in a soluble form. Use of the drug in the drinking water is sometimes advocated because sick chickens and turkeys usually will drink water at a time when feed consumption often is reduced. Another important practical factor is that it is easier for poultrymen to add drugs to the water. It is difficult at times to add the drug to the feed. The trend is away from feeding an all mash ration and toward free-choice feeding of grains and a protein supplement and the use of granulated, crumbled, or pelleted feeds. It is rather difficult to control the drug intake on a flock where a protein supplement and free-choice feeding of grain are used. If the drug is added to the protein supplement and the feeding of grain restricted, one may obtain the desired results, but if the flock is in production, one should hesitate to change feeding habits.

Dr. B. S. Pomeroy

If the granulated feeds are being used, it is difficult to get the proper mixture of the drug in the feed. If one changes drastically from granulated or pelleted type of feed to a medicated mash, the birds, particularly turkeys, do not like the change and many will refuse to eat the mash, will lose weight, and

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die of starvation. The change in feed may cause more concern than the disease itself.

All the advantages of the use of sulfonamide drugs in the water are not here recited. When the sodium salt is used in the water, it is extremely important to watch the water consumption of the flock. A flock on range where unmedicated water is available in the form of stagnant pools or running water will not drink the medicated water but will seek out these other sources and thus defeat the purpose of the treatment. If a flock is in production, or the weather is hot, and medicated water is used, it is always important to watch the water consumption. It has happened time and again when laying flocks are treated in this way that more harm is caused by the treatment than by the disease itself. Because of the bitter taste of the medicated water, consumption is reduced, resulting in a rapid fall in egg production and with some birds thrown into a molt.

Because of the large investment in a turkey enterprise, usually highly financed, many turkey growers and feed salesmen advocate the use of sulfonamides in the water or feed at the first sign of any abnormal loss. Many times the abnormal loss is not due to an infectious disease, but to some management problem. Young turkey poults do not like the addition of drugs to the water and will refuse to drink and so die of dehydration. Whenever one of this group of drugs is used on baby turkey poults, either in the feed or water, the water and feed consumption and signs of toxicity should be noted and the drug removed at the first adverse indications.

Sulfanilamide

The use of sulfanilamide in poultry diseases is not indicated at the present time. When used at concentrations of 0.25% or more in the feed on laying hens, egg production and shell thickness are affected[1].

Sulfathiazole

Until the introduction of the sulfapyrimidines (sulfadiazine, sulfamethazine, sulfamerazine), sulfathiazole was used rather widely in certain diseases of chickens and turkeys and appeared to be the sulfonamide of choice in infectious coryza of chickens[2]. The drug has been used for fowl cholera in chickens and turkeys, infectious coryza in chickens, and salmonellosis, fowl typhoid, pullorum disease, paratyphoid infections and cecal coccidiosis.

The usual recommendation for the use of sulfathiazole in the feed is 0.5%, to be fed for five days. It appears that at this level the birds show less toxic effects of the drug and maintain good feed consumption. Desired results are obtained if the sodium salt is used from 0.05 to 0.2% in the drinking water.

To be effective for cecal coccidiosis the drug must be used at 1.0 to 1.5% level and because of toxic reactions to the high levels, it is not advocated[3].

In pullorum disease and paratyphoid infections in chicks and poults, sulfathiazole at 0.5, 1.0, 2.0 and 3.0% levels was found ineffective[4].

In outbreaks of fowl cholera and infectious coryza, this drug may have to be repeated at intervals to control the disease. In most outbreaks of fowl cholera, treatment reduces the mortality and allows the owner to market the flock.

In sinusitis in range turkeys and sinusitis and air sac infection in adult turkeys, sulfathiazole in the feed or water has little effect on the course of the disease.

Sulfaguanidine

Sulfaguanidine has been used more widely than other sulfonamides for the prevention and treatment of intestinal infections of poultry. Because of its property of being slowly absorbed from the gastrointestinal tract, high concentrations may be maintained at the site of infection without serious hazard of systemic toxicity. The sulfapyrimidines are now replacing sulfaguanidine because they are as effective in controlling coccidial infections as sulfaguanidine.

For cecal coccidiosis, *Eimeria tenella*, 1% level in the feed is necessary to obtain satisfactory results. At this level the drug has therapeutic effects as late as 48 hours after inoculation[3].

For intestinal coccidiosis, *E. necatric*, 1½% level in the feed is required to obtain prophylactic effects. This type of infection may cause serious loss, and sulfaguanidine has value if the disease is recognized early[3].

At 0.2% level, sulfaguanidine prevented infection from the other six species of Eimeria that occasionally cause outbreaks of coccidiosis in chickens[3]. It appears to have value in some of the other enteric infections in poultry. Under field conditions, ulcerative enteritis in turkeys responds to treatment with this drug. Sometimes this condition is complicated with coccidiosis. The recommended dosage is 0.5 to 1.0% for four or five days.

Our concept on the control of coccidiosis in chickens has changed radically. During the war period, the use of the deep litter became very popular on many poultry farms. Until this method of handling poultry house sanitation is proved dangerous from the standpoint of disease control, the use of deep litter will become more popular. Basically, this method consists of using a litter such as shavings or chopped straw four to six inches deep and continuing to add litter from time to time to keep it dry and loose. Some poultrymen do not change the litter for the entire period of the laying season or for the period the the chicks are confined to the brooder house. In broiler plants, the same plan is followed. Instead of controlling coccidiosis by sanitation, this method encourages the development of coccidiosis so that the birds develop a mild form of the disease and obtain immunity. The loss is controlled by the use of one of the sulfonamide drugs. These are used in one of several methods that will be described.

Sulfadiazine

Sulfadiazine has not been used widely in veterinary medicine, and since the development of sulfamerazine and sulfamethazine, these drugs have received more emphasis and are considered superior on account of the greater duration of therapeutic blood concentrations.

Sulfadiazine at 0.4% level in the feed has value in preventing the development of cecal coccidiosis up to 96 hours after exposure. When used as sodium salt in the drinking water, the drug was effective[3].

Sulfadiazine at 0.5% in the feed was effective in reducing mortality against pullorum disease in chicks. In paratyphoid infections, it appeared to be effective in reducing the mortality. In poults, this drug appears to be the choice for Salmonella infections. It is recommended at 0.5% concentration in the feed for three to four days, to be repeated if necessary in three to five days[4].

Sulfamerazine

Sulfamerazine, like sulfamethazine, has distinct advantages over other drugs of this group, but sulfamerazine has not been used as extensively as sulfamethazine in the treatment of poultry diseases.

Sulfamerazine at 0.4% level in the feed is highly effective against cecal coccidiosis[5].

Like sulfadiazine and sulfamethazine, the drug is effective in preventing cecal coccidiosis up to 48 to 96 hours after exposure. The sodium salt at 0.1 to 0.2% in the drinking water is equally as effective.

In pullorum disease in chicks and poults, 0.5% level in the feed and 0.1 to 0.2% of the sodium salt in the water has reduced the loss from pullorum disease[4].

In fowl typhoid, sulfamerazine appears to have considerable value when used in the feed at 0.5% level or 0.2% of sodium salt in the water[6].

In paratyphoid infections in chicks and poults, 0.5% level in the feed or 0.1 to 0.2% of the sodium salt in the water appeared effective in reducing the loss[4].

Sulfamerazine in fowl cholera appears to show promise in reducing mortality in chickens and turkeys, but the treatment must be repeated at intervals in order to control the loss[7]. Ofttimes as soon as the drug is withdrawn there may be a recurrence of the disease. The recommended dosage is 0.5% in the feed for three to five days.

Sulfamethazine

This drug has become one of the most popular of the group in veterinary medicine.

In cecal coccidiosis, the recommended dosage is 0.4% in the mash and 0.1 to 0.2% of sodium salt in the water. The drug is effective in preventing cecal coccidiosis 48 to 96 hours after exposure[5].

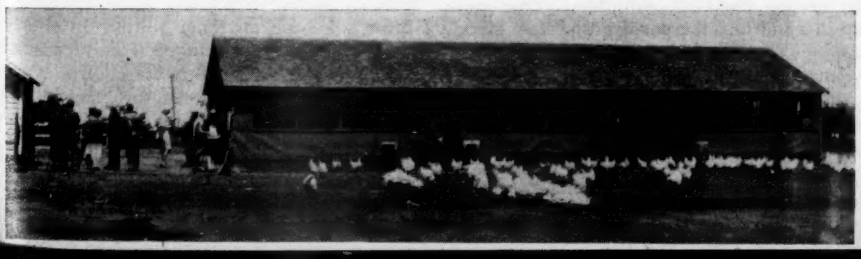
In fowl cholera, the drug is effective in reducing the mortality and is recommended at the level in the feed of 0.5 or 0.1% levels in the drinking water[7].

In pullorum disease and paratyphoid infections in chicks and poults, the drug is recommended at 0.5% in the feed and 0.1% of the sodium salt in the water[4].

Sulfaquinoxaline

Although this drug has been available for several years, it has been only recently that sulfaquinoxaline was found effective in certain poultry diseases.

When used at levels suggested for other of the sulfonamides this one is very toxic, causing



poor growth, and hemophilia. But when the drug is used at low levels it does not have toxic effects.

In comparing the toxicity of various members of this group, lots of day-old chicks were used. The following drugs were fed at 0.5 and 1.0% levels for five and ten days; sulfathiazole, sulfadiazine, sulfamerazine, sulfamethazine. Sulfaquinoxaline was used at 0.05 and 0.1% levels. The chicks showed no toxic effects during the period of observation of 12 weeks and showed a gain in weight as good as the control lots[9].

Singsen found that 0.01 or 0.02% sulfaquinoxaline in the feed did not reduce the growth of either male or female chicks up to eight weeks of age. The chicks received the drug continuously from the seventh day up to eight weeks of age. The inclusion of 0.03% sulfaquinoxaline in the diet definitely retarded the growth of female chicks[9].

Day-old chicks may be started on a low level 0.0125% of the drug in the feed and fed continuously for eight to ten weeks without any effect on rate of growth and feather development[9].

The drug has shown value in controlling cecal and intestinal types of coccidiosis[10, 11] and has given beneficial results in Pasteurella infections of chickens[12] and turkeys.

Control of Outbreaks of Cecal Coccidiosis: As soon as the disease is recognized, add sulfaquinoxaline in the feed at 0.1% (1 lb.: 1,000 lb. of feed) concentration and provide medication for at least two days. Again use regular feed for three days and follow with two more days of treatment. The 2-3-2-3-2 schedule is recommended. Since birds develop an immunity to *E. tenella*, the objective in the control and treatment is to keep a balance between sufficient exposure to permit the development of immunity and excessive exposure that produces death and stunting.

As an alternate to the above program, prevention of outbreaks by the continuous method may be employed. When sulfaquinoxaline is administered continuously in the feed at a concentration of 0.0125%, (4 oz.:2,000 lb. of feed), the drug helps to minimize the occurrence of outbreaks of cecal coccidiosis. Medication may be started on day-old chicks or any time before onset of symptoms. One must keep in mind that the passage of a few bloody droppings should not be considered an indication that the drug is failing. Also, there may be some loss from the disease, usually it is less than 1%, but if the outbreak appears more severe, it may be desirable to increase the concentration of the drug in the feed to a level of 0.05% for three days (1 lb.: 2,000 lb. of feed).

The intermittent method of treatment also has adherents. This plan is predicated on the observation that outbreaks of cecal coccidiosis appear most frequently when the birds are four to six weeks of age.

The recommended procedure is to use sulfaquinoxaline at 0.05% two days (1 lb.: 2,000 lb. of feed) out of five and repeat this schedule over a four week period.

Intestinal Coccidiosis: Intestinal coccidiosis of chickens is caused by seven related kinds of coccidia. *E. necatrix* is responsible for some of the serious outbreaks, and others retard growth and interfere with feed utilization. Results are superior if sulfaquinoxaline is used as a preventive agent rather than as control measure during outbreaks. The recommended procedure is to use 0.0125% of the drug in the feed for a two-week period. Occasionally it is necessary to increase this level.

Fowl Cholera: In acute fowl cholera, the 0.05% medicated feed is recommended for two or three days, repeating this procedure at three or four-day intervals.

In laying birds, the drug is not recommended for more than five consecutive days. One should allow three or four days between periods of medication.

When used at the rate of 0.033% in the mash under field conditions, the drug has value in the chronic type of fowl cholera. The limiting problem in the use of sulfonamides for the control of fowl cholera is that the birds do not appear to develop immunity and suffer recurrence of the chronic form.

Use of Sulfaquinoxaline in the Water: The recommended strength in the water is 0.04% (1.5 oz. of the solution of sulfaquinoxaline sodium to a gallon of drinking water) for severe outbreaks and 0.025% (1 oz.) for the mild outbreaks. The drug in the water is used on the 2-3-2-3-2 schedule for coccidiosis and cholera.

Enterohepatitis in Turkeys

In some of the turkey-raising areas of the United States, blackhead is still the major cause of loss in range birds. In spite of rigid sanitation procedures, it may cause serious loss before brought under control. Various drugs have been suggested for blackhead, but none has proved successful. Moore[13] found under semi-controlled experiments that sulfa-

quinoxaline at 0.033% level reduced the loss from this disease. Recent experiments under laboratory conditions at the University of Minnesota[14] indicated that sulfaquinoxaline had some value in prevention, but the results were not encouraging.

Coccidiosis in Turkeys

There are two described species of coccidia that are responsible for coccidiosis in turkeys.

The control of coccidiosis in turkeys on large commercial farms has not been difficult, but occasionally sanitary procedures fail and coccidiosis may cause a 50 to 60% loss. Usually the loss is not that high, but it may cause concern to the turkey grower.

Sulfaquanidine has done a good job in controlling outbreaks. It has been used at 0.5% level, but recent work of Peterson[15] indicated that 0.1% in the feed was effective.

Sulfaquinoxaline in the water at 0.005% level (1 oz:5 gal.) gave good results. Sulfamethazine and sulfamerazine at 0.02% in the water was effective (1 oz. to 5 gal. of water). The treatment was effective if begun at any time up to 96 hours after exposure and continued for four days or longer. Losses occurred when the treatment was used for only a portion of this four-day period. Under field conditions, the recommended dosage was doubled, sulfaquinoxaline in the water 0.01% (1 oz.:2½ gal. of water); in mash 0.02% (1 lb.:5,000 lb., 1 oz.:300 lb.). Sulfamethazine or sulfamerazine was indicated at 0.1% in the mash or in the water .04% (1 oz.:2½ gal.). Sulfaquanidine was effective at .21% (1 lb.:500 lb.) in the feed. Continue medication until death loss stops and then reduce the medication one-half of the original level for a week to ten days.

Conclusions

1. The sulfonamides have a definite place in the control of certain diseases of poultry. The idea that prevails with many poultrymen and hatcherymen to try one of the sulfonamides, and if the flock does not respond to the treatment, then to seek an accurate diagnosis, should be condemned.

2. In the respiratory infections of bacterial origin such as fowl cholera or infectious coryza, these drugs will reduce the mortality and control the infection. Immunity developed during the treatment of these diseases is not adequate to prevent recurrence of the infections, therefore the drugs should be used as a salvage program.

3. Sulfaquinoxaline shows considerable promise in acute and chronic fowl cholera. Sulfathiazole can be used to advantage in infectious coryza and fowl cholera. Sulfamerazine and sulfamethazine are indicated in fowl cholera and coryza.

4. In the Salmonella infections such as pullorum disease, paratyphoid infections and fowl typhoid, sulfadiazine, sulfamerazine, and sulfamethazine are indicated. These drugs have value in reducing mortality and allowing development of a salvage program.

5. At the present time, this group of chemotherapeutic agents shows the most promise in the control and treatment of coccidial infections of chickens and turkeys. Sulfaquinoxaline appears to be the drug of choice at the present time, although sulfadiazine, sulfamerazine, and sulfamethazine are equally effective.

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The Relation of Nutrition to Swine Enteritis

Notes taken from an address by Dr. Frank Thorp, Jr., Research Professor, Michigan State College, East Lansing, presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

The etiology of swine enteritis has offered divergent problems to the swine pathologist for years. At the present state of our knowledge, several forms of enteritis are recognized and classified. Doyle[1] has shown that swine dysentery is a disease distinct from necrotic enteritis. The role of hog cholera in producing symptoms of chronic enteritis was first observed and reported by Gibbs[2] and later confirmed by Doyle and Walkey[3]. Salmonellosis as a cause of enteritis has been demonstrated by a number of workers and finally it has been shown that malnutrition may be a primary cause of enteritis in young pigs.

Nutritional enteritis resulting from deficiencies in the ration of vitamins of the B-complex, has long been suspected as contributing to the disease syndrome observed in the field.

In experiments at the Michigan State College,[4] making use of pigs obtained from farms, some interesting facts reveal sufficient evidence that deficiencies of niacin, pantothenic acid, and possibly riboflavin, produced symptoms of swine enteritis.

Experiments

Four criteria were used in selecting pigs for studies; (1) symptoms of diarrhea, (2) ration fed suspected to be nutritionally inadequate, (3) absence of appreciable fever, and (4) general unthriftiness. Pigs selected for trials were emaciated, some to an extreme degree; and ascariasis and mange were invariably present. The characteristic appearance of a poor lot of pigs having drooping ears and pendant-like tail to which a ball of manure was attached, rough, lusterless coat, and bony frame, and inappetence, was common to all.

The poorest of these specimens was autopsied and pathological studies were made of the affected tissue. Gross lesions were chiefly confined to the large intestines. The walls were doughy to the touch and fluid was often present in the interintestinal mesenteric attachments, indicating edema. In an occasional severe case, the large intestine was adhered to the abdominal wall by fibrin and in longer standing cases, by fibrous adhesions. Thickened wall, with exudate covering the mucosa, was observed on opening the intestine. Liquid and pasty feces were usually present in small quantity, portions of which remained attached to the mucosa after washing. Folds were permanent and area congestion often present. Nodules containing a cheesy exudate were found in the terminal portion of the colon. Histological examinations of sections of the digestive tract involved were made which demonstrated the overlying exudates of mucus, necrotic epithelium, and inflammatory cells in various stages of degeneration. Mucus was observed streaming from ballooned glands.

Average determinations in blood studies indicated a slightly lowered hemoglobin content, and increase in leukocytes. Urine determinations of 24-hour samples revealed a reduced excretion of niacin, thiamine, nicotinic acid, and pantothenic acid. These clues provide the evidence that such pigs are not getting sufficient amounts of these vitamins to maintain health.

Response to Diet Correction

Because of lack of appetite, no reliance could be placed on the ability of the animals to consume enough feed to promote growth. Accordingly, a solution containing various B-vitamins was given intraperitoneally to assist in restoring appetite, a vermifuge was administered, and the mange treated. All the pigs were fed rations containing 23% and 19% protein with added B-vitamins. Growth response was excellent in those remaining after losses that occurred in groups during the first week. Of the total of 80 pigs with nutritional enteritis of the severest nature, 69, or 86%, were completely relieved of all symptoms by the intraperitoneal injections of B-vitamins, followed by feeding an adequate ration. Blood and urine studies, together with postmortem examinations, demonstrated relief of symptoms and pathology.

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The program of artificial insemination of dairy cows may have far-reaching effects on features of cattle sterility that are of interest and importance to the veterinarian.—*W. L. Boyd, D.V.M.*

A Practitioner Treats Mastitis*

ROBERT CURTIS, D.V.M., Portage, Wisconsin

MASTITIS is a major problem in most veterinary practices in dairy sections. In recent years, the increased interest in better breeding, the emphasis on higher production, higher milk prices, and use of higher protein feeds, have highlighted this disease. In other words, losses in production and animals have assumed economic importance because of greater unit investment, larger overhead and a desire for higher producing animals. This was true during 1920 to 1930, but mostly in pure-bred herds. The trend in the average herd began in the late 1930's and the demands during war time increased the valuation of all livestock. Mastitis became increasingly important to all concerned.

It has been stated that with one possible exception, there have been more pages written about mastitis than any other veterinary subject. The veterinarian is most interested in diagnosis and treatment of this condition. There are probably as many definitions of acute and chronic mastitis as there are authorities on the subject. From a practical standpoint, acute mastitis is that condition found when an owner demands that we come right out to treat a sick cow with a swollen udder. Chronic mastitis is the case presented by "What can I do for a cow giving thick milk?" In other words, chronic mastitis is identified as an infection by a positive Hotis and/or microscopic test, or where there is a history of abnormal milk with no apparent mammary inflammation or general illness. Any other inflammatory condition of the udder, from a hot, swollen quarter to a general toxemia, may be considered as acute mastitis.

It is in the latter classification that 75% of our cases of mastitis fall.

The advent of the antibiotics has placed a means of treatment in the hands of everyone. The diagnostic service a veterinarian is in position to give dairymen and the proper prescription for treatment are prerequisite to adequate control. Every available and practical diagnostic instrument is employed in our practice. The veterinarian who fails to use simple field tests or attempts to reach a diagnosis by a glance or two and a general appraisal of the animal, is failing his client and his profession. Our clients have been deluged with advertising and extension service educational meetings and are conscious of what is necessary in the care of livestock.

Differential Diagnosis

On careful examination, several combinations of clinical symptoms usually are presented: (1) The readily perceivable swollen quarter, abnormal milk, but otherwise normal cow; (2) the similar case with a temperature of 103 F. or higher, off feed, and some stiffness in movement; and (3) the most important case because of its questionable prognosis, the animal with a temperature of 100 F. to 101.5 F., a rapid heart beat, diarrhea, inappetence, which the owner cannot understand, gaunt appearance, rough hair coat, and one or perhaps two quarters secreting a dark watery material. This, of course, is the onset of acute septicemic or gangrenous type mastitis. In some cases, the temperature may be elevated, but in early stages the owner professes an ignorance of unusual udder or milk conditions. As this syndrome progresses, the owner notices the dark, bloody fluid and possibly coldness of the teat and/or "a queer air sucking noise" when he tries to milk the infected quarter within a few hours.

A proper differential diagnosis in all cases is of the utmost importance, as careful treatment will be necessary to save even half the cows down with acute mastitis. Before hastily grabbing the calcium, one should pause and take a second look. Even though the cow is lying on most of her udder, as much as possible should be examined with the hand and each teat palpated. Some of these animals can be stretched out to make the examination easier. Cows suffering acute inflammation of the udder usually evidence more pain, have a glassy, starey eye, contrasted to the dull, droopy look of the comatose milk fever case. First-calf heifers are seen frequently in this condition due to a severe udder infection. The higher than normal temperature in many of these downers is of diagnostic value.

Occasionally a cow is observed with an injured or hard milking teat, from which the owner maintains he is getting normal milk with the aid of a tube or by careful hand milking. The use of the strip cup soon demonstrates to him that the milk is not normal and may

*Notes taken from an address presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

even be infected enough to produce the chills which he observed in the cow, though she is not otherwise sick. Bloody milk, especially in recently fresh cows, is also observed. Then, of course, the severe, often suppurating skin infection which appears on the median line of the udder is confused by the owner with mastitis. By this time in the examination, the owner is usually asking the questions and I am attempting to answer. From a practical, as well as a pathological standpoint, I explain mastitis as a wound infection, producing few or large quantities of toxins which in gangrenous mastitis result in a true case of blood poisoning. This description, along with the explanation that this infection gets into the udder through the teat opening, makes a logical line of reasoning which almost any cattle owner can understand. The great importance of injuries, however slight, improper milking practices, and the strain of freshening on the gland are brought into the picture.

Treatment

Like definitions, treatments are numerous and varied. Penicillin has been used widely and indiscriminately in our territory. It is well to ascertain as soon as possible just how much of this antibiotic has been used. Little good is done by injecting any drug into an acutely swollen quarter. A careful examination of such quarter, if available for autopsy, will demonstrate this. Unlike a normal or near-normal quarter, the passageways are so clogged and congested that no drug can possibly reach areas of infection. This was brought out by Doctor Spencer of the University of Wisconsin in careful microscopic examinations of fixed udder tissues.

This wound infection, with accompanying chemical changes in secretion, has also produced varying types and quantities of pus. Like any extensive abscess, drainage must be established. This means that unless a severe injury with much soreness precludes the operation, the infected quarters should be stripped out every hour or at least every time the farmer can get into the barn. Naturally, the aseptic precautions he should employ are emphasized. There has always been some debate as to the value of hot or cold packs. For swollen quarters giving clumpy, stringy, or slightly abnormal milk, in the absence of toxemia, hot packs for at least 30 to 60 minutes at a time are beneficial. An increased blood supply will certainly help to remove the toxins accumulating. On the other hand, where septicemia and gangrene are imminent, cold ice packs theoretically hold down the blood flow to decrease the absorption of toxins into the blood stream. It is difficult in many cases to get owners to use hot packs for a length of time to be of much help. Liquid udder liniments are dispensed. These udder liniments are readily available, easier to use in colder weather, and allow for better coverage. Neither are they offered for sale in drug stores and other sources, as are ointments.

Intravenous medication, a procedure farmers cannot employ, is used wherever possible. Nowhere is it more useful than in treating acute mastitis. I use 250 cc. of one of the soluble salts of sulfonamides in cases with swollen, hot quarters secreting a thick material and having a temperature not to exceed 103.5 F. Cows with normal temperature, fair to good appetite, with highly inflamed quarters and little change in the character of the milk, constitute the most difficult group. If there is no apparent toxemia, however mild the case, intravenous sulfonamides are not indicated. Frequent milking, application of heat, or alternate cold and hot poultices, are not recommended. Once in a while one of these quarters will produce normal milk in 24 to 48 hours, though reduced in quantity, and then the quarters will remain swollen for two or three weeks and usually eventually dry off. In other acute cases, a solution of 5% sodium sulfamerazine and 5% sodium sulamethazine is satisfactory. This solution gives superior results as compared to stronger solutions used separately. The dose is based on 250 to 300 cc. for a 1,000-lb. cow. The use of this combination has saved twice as many cows affected with septicemic or gangrenous mastitis as we were formerly able to save. This treatment, in my opinion, is the most important single factor in maintaining the prestige of the veterinarian.

At this point a word about intravenous medication. I use a gravity outfit with a 14 gauge needle and warm the solution to a point where the bottle is comfortably warm to hold in the bare hand. The therapeutic doses which are recommended are not large enough to produce shock in a near normal cow, but must be given with care to a sick animal. If desired to reduce the rate of flow, a 16 gauge needle is used. It is well to observe the reaction of a patient as treatment is administered. Trembling and twitching and other nervous symptoms are danger signals.

Infrequently, I have had varying amounts of the solution enter beside the vein instead of into it. Unlike the core formation with pus that sometimes accompanies a poor job of giving calcium or dextrose solutions, I have never

seen a case of swelling or abscess with the sulfonamides. Of course, they should not be good media for bacterial growth. It is rarely necessary to repeat the dose except for the gangrenous cases. Eight out of ten non-septicemic cases will improve within 24 hours. This interval is satisfactory for repeating the doses.

Good drainage is vital in treating gangrenous mastitis, and this is best accomplished by using a knife or scissors. If there is much blood supply remaining to the skin of the teat, a Burdizzo castration forceps is first applied and the teat amputated below it. After the amputation, I make the opening as large as possible by cutting out all the dead tissue around it. On the parts of the quarter that have turned black, deep incisions are made. In this supplemental sulfonamide therapy, dextrose or calcium and dextrose solution is given slowly. The dextrose is especially valuable and can be repeated at 12-hour intervals if desired. The boost that 250 to 500 cc. of dextrose will give to any sick animal is remarkable. I like to use a stomach tube to give eight to ten gallons of warm water if dehydration is extreme.

With the advent of penicillin, the importance of problem herds of chronic mastitis has fallen sharply. At one time we did quite a bit of herd testing with the Hotis test and microscope. The former method is reasonably accurate and not too hard to set up; the latter is probably better, but for us, is too time-consuming. When a cow is giving abnormal milk and showing little or no inflammation of the udder, we attempt to elicit from the herdsman what treatment has been given. If penicillin has been used, followed by improvement, the advantage of the proper dosage is outlined and the reason given for some failures of home treatment. Pencillin in adequate doses with sulfonamide diluents has proved to be worth the additional cost. Penicillin bougies are also dispensed to supplement treatment when indicated.

Herd Treatment

Several herds of dairy cows in our practice are checked annually with the Hotis test. On the results of this test and our suggestions, management practices are based. Results have been satisfactory to both attending veterinarian and owner. Good herd management is unquestionably the most valuable factor in controlling chronic mastitis. All the practices of proper milking, care of teats and milking machines, prompt treatment of chronic cases and teat injuries must be combined to keep down wound infection. It is hard to convince many farmers of this until they are forced by loss of good cows and drop in milk production to do so. With these men, each becomes an individual case, and the veterinarian must become a diplomat, salesman, feed advisor, and milking machine expert to be of help to them. Every field aid is employed and laboratory assistance is regularly requested to provide the best possible service.

The use of bacterins is limited. Since the availability of toxoids, no herds have been vaccinated. In individual cases, irregular response has been observed following their use. Results with aureomycin and streptomycin have not been superior, though our experience with these antibiotics has been limited.

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New Insecticide in Roots of Common Weed

The discovery of a new chemical, an amide called scabrin, is reported by the Agricultural Research Administration, USDA.

Early experimental trials with the new insecticide, derived by extracting the active principal from plants of the genus Heliopsis, (commonly known as ox-eye) indicate that it is appreciably more toxic to houseflies than pyrethrum. Aside from chemical properties, the insecticidal toxicity of the new material is the only biological fact known about it. The effect of the chemical on insects other than the housefly, toxicity, and commercial manufacturing are problems still to be explored.

The insecticidal properties of pyrethrum are contained in the flowers. Pyrethrum growing in the United States is prohibitive in cost because a great deal of hand labor is involved. A root crop, however, may lend itself to mechanical tillage and harvesting. American farmers might be able to produce such a crop profitably, if the insecticidal properties of the crop would compete favorably with the desirable pyrethrum. In the event, which appears likely, further investigation demonstrates elements of safety for general use similar to the properties of pyrethrum, one of the oldest and safest insecticides known, an important agricultural crop may be in the making for this country.

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Chemotherapeutic agents most useful in the control of specific bacterial, viral or rickettsial diseases, and that will be in common use in future years, are unknown at this time.—*L. E. Harris, Lincoln, Neb.*

Dispensing in Swine Practice*

LEE T. RAILSBACK, D.V.M., Ellsworth, Minnesota

IN considering some features of the practice of prescribing and dispensing drugs useful to control diseases and parasitism in swine, one is likely to think first of those procedures that are most useful and from which profits are attractive. In this regard, I should like to consider only those methods and materials that have been adopted in my private practice and have served the hog raisers in my county, *i.e.*, treatment of swine ascarids and hog mange.

Worming pigs is a part of practice that in some areas has been neglected by veterinarians. This neglect existed in my practice until three years ago. At that time the number of pigs treated, or for which anthelmintics were dispensed, was a small percentage of the total number of animals in the community. Every peddler up and down the road had a "hog-wormer" and also possessed the necessary salesmanship to sell it. The peddler who did the best business was one who administered the medicant free of charge; of course, he sold the product he administered for $16. a gallon.

During this period, sodium fluoride was coming into favor. This drug was used on several droves, and was demonstrated to be a safe and effective treatment. At this time, a decision was made that my services and sodium fluoride could be profitable to the swine grower.

Now the drug is purchased in bulk at a price that allows a fair profit when sold at a figure that is competitive with dealers. A supply in suitable, neat packages is carried at all times. When indicated, the suggestion is made that treatment for worms should be given and advice and instruction based on experience are given, when the drug is dispensed. Sales of swine remedies by peddlers in my section have been small during the past two years.

Actually monetary gain in dispensing such a drug as technical grade sodium fluoride is small, but the benefits to hogs and to me are large. The high efficiency in removing roundworms over previously employed methods is well known. The encouragement of farmers to seek advice on all matters pertaining to the health of their animals and attending to all matters of herd health will unmistakably place the attending veterinarian in a favorable position.

Our methods of treatment follow those recommendations generally outlined; that is, allowing only sodium fluoride-treated, dry ground feed for a 24-hour period. The concentration of 1% appears to be safe. Poisoning is unlikely because of self-limited intake. Vomiting may follow occasional overeating. It is not necessary nor desirable to fast the pigs before treatment nor to purge them afterward. The treated food acts as an intestinal irritant sufficient to stimulate elimination. Treatment in heavily infested herds is repeated in four to six weeks.

Unfavorable results in worming pigs with sodium fluoride are rare, usually occurring in animals whose resistance is lowered by complication with bacterial enteritis. Sodium fluoride, as a vermifuge in pigs showing symptoms of enteritis, is contraindicated. If the load of parasites is believed to be responsible for the enteric symptoms, small doses of the least toxic and safest drug should be used. Pigs should not be wormed earlier than 30 days after serum and virus vaccination.

Mange in Swine

Mange costs the swine industry an unestimated amount of money every year and perhaps greater loss than any of the infectious diseases of swine which attract much of our attention. Since effective methods are available for controlling mange, losses in gains and weight due to mange are inexcusable.

Here, too, peddlers, filling stations, feed stores, and drug stores have done a large volume business selling mange preparations. Spraying affected pigs was a never-ending process with swine owners. Growers repeated treatment every ten to 14 days during the summer season with only partial control of the infestation.

Mange is probably more prevalent when pigs are closely confined, at least it is more of a problem under crowded conditions. However, it does affect hogs of all ages and during all seasons. It is a common belief that a white hog is more susceptible to mange than other breeds. Of course, this is not true; the greasy, dirty appearance just shows up better in white pigs. The infestation of mange mites definitely makes a runt of a pig, seriously affecting

*Presented at the 66th annual convention of the Indiana Veterinary Medical Association, Indianapolis, Jan. 12-14, 1950.

growth, and may even cause death in young pigs.

Benzene hexachloride (BHC) and chlordane are products that should be used only on the prescription of the veterinarian. If improperly used, results are likely to be unsatisfactory. Proper employment and the exercise of care are followed by practical, complete eradication. BHC is the drug of choice. The pig must be thoroughly wet, either by spraying or dipping with a solution containing 0.25% gamma isomer of BHC. This wetting should include the external ear canal.

Generally, it is recommended that small pigs be dipped, and those too large to handle easily may be crowded into a pen or chute well bedded with straw, which previously has been wet to assure wetting the bellies.

BHC is safe. Solutions will cause the eyes to smart, but the irritation is temporary. Some clients have reported that it irritated their faces for a few hours following its use, but on the following day there were no ill effects. I have used it on pigs less than a week old, and on sows the week prior to farrowing. Reports of toxic reactions in pigs kept penned for too long are rare.

Conclusion

As mentioned, discreet veterinary dispensing will benefit the livestock grower and the practitioner. A supply of those useful items for the prevention and control of common parasitism and disease conditions, may constitute a sort of traveling pharmacy. Such practice tends to create a spirit of confidence, because of the interest demonstrated by practitioners in those everyday problems of farmer clients.

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Physiology of the Rumen*

In studies on the effects of starvation on the activity of the ruminal flora, it has been found that during 96 hours' starvation the total volume of rumen contents was only slightly diminished but that it became progressively more watery. Both sugar fermentation and cellulose digestion were markedly retarded after 48 hours.

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Therapeutic doses of sulfonamides introduced directly into the rumen suppressed both cellulose digestion and appetite. The advisability of administering sulfonamides to ruminants *per os* is questioned.

*Notes on recent investigations into the physiology of the rumen, which is a brief summary of work done at Onderstepoort, South Africa. This comprises papers already handed in for publication in the *Onderstepoort Journal*, by Dr. R. Clark. *Jour. South African Vet. Med. Assn.*, 20:174 (Dec.), 1949.

In cases of ruminal paresis in sheep, induced by giving graded amounts of potassium cyanide, subsequent subcutaneous injection of small doses of carbamylcholine chloride (carbachol, U.S.P.-lentin) caused an immediate total and prolonged paralysis of the rumen, together with acute respiratory and circulatory embarrassment. Carbamylcholine chloride is therefore contraindicated in rumen stasis due to prussic acid poisoning.

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Acute intoxication characterized by rumen atony and sudden death due to circulatory failure, followed the introduction of as little as 10 gm. of urea into the rumen of sheep through permanent rumen fistulae. The toxicity of urea was found to depend on the activity of the ruminal flora as determined by the basic diet and absence of available carbohydrates. Sheep on a low protein diet were highly susceptible. In others, toxic symptoms appear to develop due to the absence of a ruminal flora adapted to a high rate of nitrogen metabolism. Utilization of ammonia could not take place at a corresponding speed. The toxic symptoms were associated with the liberation of ammonia within the rumen and the consequent alkalinity of the contents. It is postulated that under such conditions toxic nitrogenous metabolites were formed.

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The vagal center governing rumen motility appears to be affected by changes in the acid base balance of the blood. The experimental use of acetic acid in cases of rumen stasis and digestive disorders in ruminants was advocated. The dose tentatively recommended was 50 cc. of glacial acetic acid in two quarts of water for a cow. It was further suggested that one pound of sugar could be added with benefit.

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Importance of Meat

Meat: A Medical Marvel, designates an article in *Coronet* for May, in which is pointed out the value of meat proteins in human health and general resistance to disease.

"An amazing dietary revolution is now under way," states the author, J. D. Ratcliff. "The glamorous vitamins are giving up the spotlight to the even more glamorous proteins."

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Grasshopper damage to crops and rangeland of the midwest and west is reported to be almost a certainty following favorable seasons for the development of this pest.

Sutures And Suture Materials*

W. W. ARMISTEAD, D.V.M.,** Columbus, Ohio

FEW THINGS are more difficult to put into words than a description of suturing methods. Furthermore, few things are more tiresome to practitioners than a dissertation on the classification of suture materials. This presentation, therefore, will consist of what might be considered random remarks about the use of sutures.

Capillary vs. Non-capillary Sutures

The matter of capillary *versus* non-capillary suture materials has been given a thorough going-over in the literature but it will do no harm to mention briefly a few important considerations here. First, capillary sutures are those which are capable of absorbing fluids, such as wound secretions. This classification includes many of the oldest suturing materials. Capillary sutures may be divided further into absorbable, such as catgut and kangaroo tendon, and non-absorbable, such as plain silk, linen, and cotton.

A non-capillary suture is one which will not absorb secretions and which cannot, therefore, act as a wick. It is serum-proof. Non-capillary sutures are non-absorbable and include the most versatile of modern suture materials; treated silk, nylon, and the various wire sutures. Although there are those who disagree, I believe that only non-capillary material should be used on an epithelial surface. It is true that plain silk, linen, and other wick-like sutures have been used for years, but there seems to be every justification for using skin sutures which cannot postoperatively spread infection from the outside to the inner tissues.

On the other hand, either capillary or non-capillary material may be used for buried sutures. It must be confessed here that I am still old-fashioned enough to prefer catgut for buried sutures wherever its absorption does not constitute a disadvantage. Many surgeons do not realize that the tensile strength of dry catgut is greater than that of silk. Actually, with correct aseptic technic, the surgeon can bury successfully almost any kind of suture.

Many veterinarians now use stainless steel wire extensively. One of my acquaintances uses it exclusively. Personally, I find few uses exist for it in suturing soft tissue. Certainly there are few tissues other than bone, cartilage, or perhaps tendon, which require the great tensile strength furnished by steel wire sutures. Large gauge steel sutures are unwieldy and unnecessarily strong; small gauge steel sutures cut badly if they are used where their strength is needed.

It is doubtful that wounds disrupt often because of sutures breaking. In my experience, wound dehiscence usually has been due to sutures becoming untied, to their cutting through the tissue, or to early deterioration of catgut in infected wounds. Howes[1] has shown that even no. 0 catgut has greater strength than the holding power of almost any tissue, including fascia. In other words, almost any suture material the size of no. 0 catgut or larger will pull out of tissue before it will break. Size of tissue bite will not greatly alter this factor.

Well known surgeons have stated that they like steel sutures because it is possible to go back to the wound at any time and find the sutures in place. Research in wound healing has shown that most wounds disrupt between the fifth and twelfth days and most frequently between the seventh and ninth days[2]. There is no need for sutures in a properly healing wound after about two weeks. Consequently, one might say, and with somewhat more justification, that catgut sutures are preferred because there is no sign of them in the wound two months after surgery. The principal reasons for the preference for steel are: It can be easily and absolutely sterilized, it is practically non-irritating to tissue, and it is relatively new. That there is a tendency to take up the new just because it is new, is well illustrated by the fact that many first-rank surgeons are now returning to one of the earliest and most obvious suture materials, cotton.

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**At present on leave of absence for graduate study in veterinary surgery at the College of Veterinary Medicine, Ohio State University, Columbus, from the Department of Veterinary Medicine and Surgery, School of Veterinary Medicine, Texas A. and M. College, College Station.

Through-and-Through Suture

A few years ago I published a brief article entitled, In Defense of the Through-and-Through Suture. It was not a very profound article—just a quiet little argument against the prevailing tendency to black-ball that versatile suture. I was somewhat surprised to find that it was widely read, but somewhat distressed to learn that it was widely misunderstood.

I have never advocated the use of the so-called through-and-through suture for closing any and all abdominal incisions. While it may be used successfully in combination with other sutures in almost any abdominal incision, its most practical application is in closing the ordinary spay wound where the incision is relatively short, in the median line, and when the time factor is important, as it usually is to practitioners.

The average practitioner makes an incision from one-half to one inch long for an ovariectomy in a young virgin bitch. It is not only a waste of time to use the popular tiered closure here, it is mechanically difficult. A one-inch abdominal opening may be efficiently closed with two interrupted through-and-through sutures and one skin stitch between. The time and material required is but a fraction of that needed for a tiered closure, and over 1,000 consecutive cases closed by this method at Texas A. and M. College prove the adequacy of the method.

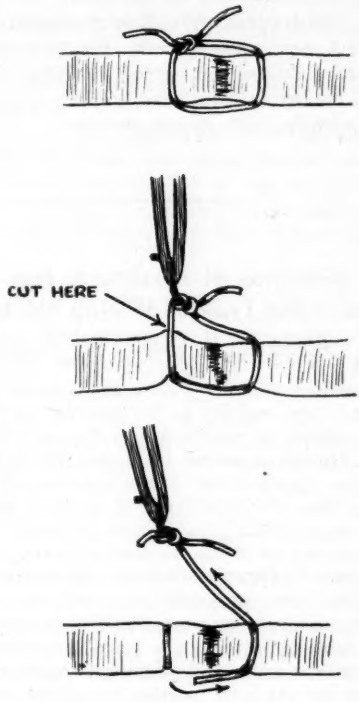
The advantages of the through-and-through suture, when and where it is appropriately used, have been recognized by many surgeons, including Orr,[4] Reid,[5] and Wiley[6]. Most of the objections to its use in veterinary medicine may be attributed to lack of familiarity with its proper employment, or to prejudice. It should not be abandoned simply because it is not widely used in human surgery. Human surgeons also frown on the administration of vaccines in the neck region, intravenous anesthesia, and euthanasia—all prominent features of veterinary practice.

Removing Sutures

The method of removing sutures, whether through-and-through or other removable sutures, is given too little thought by surgeons in general. Here is a method which will minimize the spread of contamination during removal. (It is assumed that at the time of operation the suture knots were pulled to one side of the incision line in the usual manner.)

a. Paint the operative area and the exposed portions of the stitches with a good antiseptic solution.

b. Grasp a loose suture end and pull straight upward at a right angle to the skin (see illustration). This exposes beneath the



knot a portion of the suture which has been buried in the skin since the operation was completed.

c. By cutting through this clean exposed portion, only clean suture is drawn through the tissues as the suture is removed.

d. Repaint the stitch wounds with antiseptic. This helps to prevent infection of the suture holes and, especially if it is an alcoholic antiseptic, hastens sealing of these holes.

Since the lay client ordinarily judges your surgical ability by the size and appearance of the scar you leave, the prevention of so-called stitch scarring is important. The fact that even a large hypodermic needle leaves no scar is an indication that the suture or needle are not themselves the sole cause of stitch scarring. Scarring is due largely to stitch cutting and cutting almost always results from too

much tension on the sutures. To prevent scarring, then, avoid drawing sutures too tight. Always allow for a little normal swelling and remember that tight sutures will only increase swelling which will, in turn, further increase tension and cutting.

This discussion was not intended to be complete. The fundamentals of good surgery and suturing were omitted under the assumption that this audience is already familiar with them. Besides, suturing, like knitting, is an art best perfected with patient practice.

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The Incidence of Mastitis Is Not Related to the Type of Milking Machine

H. G. HODGES, D.V.M., DEWITT BAKER, D.V.M., and S. J. ROBERTS, D.V.M., M.S., Ithaca, New York

Gambrel[1] recently stated he believed suspended type milkers to be superior to claw type milkers in controlling mastitis in a dairy herd. He indicated that the suspended type of machine appeared to be less injurious to the udder than the claw type of machine which was more difficult to operate properly. The authors find all of the standard or more popular types of milking machines, either suspended or claw, in use with dairymen obtaining satisfactory results in the control of bovine mastitis.

A table appearing in a study[2] of environmental factors and their relation to mastitis, reported by the staff of the New York State Mastitis Control Program, does not substantiate Gambrel's statements. It was shown upon original or initial surveys that the most popular suspended type of milker and the most popular claw type were not significantly different in respect to the incidence of abnormal milk or udder infection. These two machines are used for comparison since approximately the same number of cows and herds were milked with each machine and the inches of vacuum used were approximately the same at the time this study was made. The tabulated data below referred to above are taken from table.

It would seem that Gambrel's article is misleading since it might cause dairymen and veterinarians to believe suspended type machines are the answer to mastitis control. The writers have seen many dairymen in trouble with mastitis regardless of the type of machine used. Many of these same dairymen using the same machine have reduced mastitis to the point where it is not a serious economic problem. This has, in general, been accomplished through adequate and judicious diagnosis and treatment, coupled with strict attention to good management and sanitation that includes proper milking practices and proper vacuum and pulsation adjustments on the machine. Many instances of individual herds could be cited as illustrations.

The writers are in complete agreement with Gambrel's statement, "The solution to mastitis problems in our herds must be a joint responsibility shared by dairymen and veterinarians. Proper, healthy, natural milking is up to the dairyman and the machine he uses. Veterinarians can do much, but the burden of disease control is up to the man who does the milking, and the manner in which he employs his machine."

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Type of milker	No. cows milked	Per cent of cows producing abnormal secretions	Percent of cows infected*	
			Negative	Infected
Suspended	1,925 (65 herds)	15.3	43.12	56.88
Claw	2,128 (72 herds)	14.6	47.41	52.58
All types and hand milking	6,546 (226 herds)	15.3	45.20	54.80

*Pathogen as shown by bacteriological examination of quarter milk samples collected directly from udders.

Control Of Body And Breath Odors With Chlorophyll Fractions

MAURICE E. SERLING, D.V.M., Larchmont, New York

ODORS of body and mouth origin in animals are a universal and difficult problem to control. Effective handling is a vital factor in the enjoyable companionship of the animal and its owner.

Lowered vitality, malnutrition, poor skin health, and abnormal eliminations are sources of body and mouth odors in dogs and cats. Irregular diets resulting in poor digestion and faulty metabolism, are contributing causes. Body odors may result from internal causes not fully understood and thus are difficult to eliminate. Many young animals at times exude a body odor, the course of which is as impossible to locate as to correct. Such animals are unfit house pets and present a challenge to the veterinarian.

Studies with chlorophyll during the past forty years have established many facts of value in the medical field,[1,2,3,4] one of the most important being its ability to neutralize body and mouth odors in human beings. Westcott[5] found during the course of studies in anemia that the odor of foods and vitamin B_1, usually detectable in urine, were greatly decreased when patients took oral doses of specially prepared chlorophyllins. This indicated that some change in the metabolism of these odorous compounds was taking place, and led to the study of its effects on perspiration and breath odors.

Control tests in man indicate that chlorophyll in tablet form,* taken orally in suitable dosages, was effective in neutralizing the obnoxious odors of the body from perspiration, the effect of the drug lasting for 18 hours or more. Similar studies in controlling known breath odors, artificially produced, aided greatly in cleansing the buccal cavity and neutralizing mouth odor for a satisfactory period. Clinical observation on breath odors caused by faulty oral hygiene and metabolic disorders, ordinarily described as halitosis, were studied for two years.

Table 1 indicates results reported by a group of ten patients.

Summary of these studies in the human field are:

1. Chlorophyll fractions used in these tests are entirely non-toxic, and suitable for ingestion.

2. *In vitro* experiments have shown their effectiveness in neutralizing malodorous substances of neutral, acid or base reactions.

3. *In vivo*, it effectively neutralizes obnoxious odors in the mouth from foods, beverages, tobacco, and metabolic changes (halitosis).

4. It effectively neutralizes the obnoxious odors from perspiration due to physical exercise, nervousness, and illness. Also obnoxious foot odors, menstrual odors, and urine odors from ingested materials.

TABLE 1. RESULTS OF TEN CASES OF BREATH ODOR

Case	Tablets	Remarks
Mrs. A.	1	Excellent for bad halitosis
E. C.	1	Good
G. Y.	1	Good
P. S.	1	Helped halitosis
J. H.	1	Helped halitosis
F. H. W., Sr.	1	Helped mouth odor from false teeth
F. E.	3	Helped bad breath but not 100%
R. C.	1	Stopped breath odor
J. R. H.	1	Helped bad breath
G. C.	1	Very good relief

From these results it appears that chlorophyll** given orally, would be indicated in the control of the various odors of animals, previously mentioned. Results of its use on 20 different dogs, are shown in table 2.

Comments on Cases Treated

Case no. 1 was given one tablet daily to establish dosage for a fishy odor of the mouth. Little improvement was shown in two days, and the owner would not continue hospitalization of his pet for this purpose.

In case no. 2 malignancy of the lower bowel on autopsy explained why relief of intestinal odors was not accomplished.

Case no. 3 was an old dog with unhealthy gums, heavy tartar on teeth, many of which were loose. No dental repair was done purposely to test the effectiveness of chlorophyll orally under these difficult conditions. The mouth odor was extremely offensive, but im-

*Odolex, Walker Vitamin Products, Inc.

**Chlorodor, Pitman-Moore Co., Indianapolis, Ind.

provement in intensity and nature was noted in 12 hours and practically eliminated within 24 hours. The medication was continued for six days with no noticeable mouth odor, nor visible ill effects, then stopped for a day. Recurrence of the odor in 24 hours made it necessary to continue daily administration for control. The treatment has now been used steadily for a month.

In case no. 4 there was no apparent reason for the breath and body odor of this animal.

TABLE 2. USE OF CHLOROPHYLL IN TABLET FORM

Case No.	Breed	Weight in Pounds	Condition	Daily Tablet Dosage
1	Beagle	22	Fishy odor from mouth	1
2	Shelty	58	Cancer of intestines	3
3	Scotty	22	Mouth odor	1
4	Dachshund	19	Mouth odor	1
5	Kerry Blue	56	Mouth odor	3
6	Boxer	72	Body odor-eczema-dry	3
7	Springer	42	Body odor-eczema-moist	2
8	Boxer	68	Body odor	3
9	Shepherd	70	Body odor-eczema	3
10	Borzoi	87	Mouth and body odor	3
11	Cocker Span.	28	Fishy odor - mouth	4
12	Springer	55	Body odor	3
13	Springer	50	Body odor	3
14	Dachshund	24	Body odor - eczema	1
15	Cocker Span.	27	Body odor	2
16	Cocker Span.	20	Mouth and body odor	1
17	Unknown	40	Body and mouth odor	2
18	Cocker Span.	22	Rectal odor	1-3
19	Cocker Span.	22	Rectal odor	1-3
20	Unknown	16	Mouth odor	1
21	Unknown	34	Body odor	2

The skin was clear and no external parasites were found. The odor disappeared in between 12 and 24 hours and remained so only as long as chlorophyll tablets were given.

Cases no. 6, 7, 9 and 15 represent dogs, each presenting superficial skin changes, dry or wet, commonly seen in dogs of all ages. Causes of lesions in these cases were unknown and no treatment was given. Bathing the animal gave transient relief from the odor, but it recurred 24 hours later. Tablets given as shown aided in clearing the body odor, and were effective as long as continued. The odor recurred when the medication was discontinued.

Case no. 11, showing the same condition as case no. 1, responded to treatment but required four tablets daily.

Cases no. 18 and 19 illustrate the fact that chlorophyll fractions aid in controlling rectal odors when properly used, but here, again, have little, if any, effect on the causes of the odor. In this respect chlorophyll may have a catalytic action on the causative processes, changing the odorous compounds into less offensive substances. These are examples of the necessity of proper dosages of chlorophyll tablets. One tablet daily to each case was ineffective, but three tablets daily resulted in the rectal odors entirely disappearing as long as the medication was continued.

The remaining cases studied, not mentioned above, are generally classified as having mouth or body odors from no apparent cause. No visible pathology was present in the mouth or adjacent tissues. The skin was free of changes and lesions, as could be seen clinically. Six of the worst cases which responded were separated equally into groups of three each. One group received chlorophyll tablets in adequate doses daily, the other group received none. Without the medication the original odor returned in approximately 24 hours, and again cleared in one to two days when the medication was continued.

Control of Body and Breath Odors with Chlorophyll Fractions

It was noted that it took six to 12 hours more to eliminate body odors than to eliminate mouth odors; rectal odors required about three times longer. Fishy mouth odors required twice as much medication as other mouth odors, while rectal odors needed three times the basic dosage. During the study a particularly warm humid day resulted in a characteristic strong odor occurring in the wards of the hospital where many of these cases were kept. One chlorophyll tablet mixed in each dog's food resulted in this odor being eliminated from the wards in about twelve hours.

Conclusions

1. Chlorophyll fractions, given orally, 100 mg. per 25 lb. of body weight, aid in eliminating most objectionable body and mouth odors in dogs within 18 to 24 hours.

2. In proper dosages, chlorophyll fractions are non-toxic, well tolerated and apparently do not affect normal digestive activities.

3. Chlorophyll fractions apparently act as a catalyst in neutralizing malodorous substances of neutral, acid, or base reactions.

4. Chlorophyll fractions are useful adjuncts in the control of body and mouth odors of animals. They serve a practicable purpose in eliminating malodorous substances until the cause of the problem can be determined and corrected.

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EDITORIAL COMMENTS

Hereditary Susceptibility to Carcinoma of the Eye

Hereditary susceptibility to carcinoma of the eye in range cattle has been demonstrated by studies recently concluded by the BAI.

Records covering a 25-year period made at the U. S. Range Livestock Experiment Station at Miles City, Mont., show that 73 cows developed eye cancers; an incidence of 4.7%. Approximately 20% of affected animals were related to others infected, *i.e.*, were dam and heifer calf. In one family, carcinomas have been found in each generation since the beginning of the study in 1926. In individuals of one closed-line breeding, the cancer incidence approached 10.2%.

The report recommends removal and slaughter of infected cows and marketing offspring of these for slaughter as early as practical. Breeders are warned of the importance of selecting a herd sire in which there is no history of eye cancer among progenitors.

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Meat Inspection Service to Small Packers

Meat packers selling their products in local areas without crossing state lines will be offered a full federal meat inspection and certification service for the first time when the Department of Agriculture draws up regulations for the program. A notice of intentions to issue such regulations has been released. The regulations will be issued under the Farm Products Inspection Act and administered by the Bureau's meat inspection service.

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Iowa State College Graduating Class of 1950

Unique in the annals of veterinary classes, the 1950 graduating group of the Division of Veterinary Medicine, Iowa State College, Ames, has distinctive features of interest: (1) It is the largest class to be graduated; (2) of 67 members, 62 are veterans and 55 are married; (3) of the 55 married students, 38 are fathers of 60 children.

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Slaughter of sheep and lambs during four months of 1950 was 34% below the five-year average.—*Nat'l Prov.*

Rabies in the United States

The number of cases of rabies during 1949, as reported by the Bureau of Animal Industry, USDA, indicates the lowest incidence of this disease since 1946.

Tabulated by occurrence in animal species:

Dogs	5,237
Cattle	639
Cats	413
Swine	54
Horses	24
Sheep	22
Goats	6
Man	10
Miscellaneous	1,192
Total	7,597

This number is less than that reported for 1948 by 1,878. No rabies was reported from 13 states, and six others reported not over three cases.

Kentucky tabulated 707 cases in dogs and 315 in other species. This total of 1,022 was the largest recorded in any one state. Kentucky, Indiana, and Ohio reported an aggregate of 2,426 cases, or approximately one-third of the total for the nation. Though the incidence of rabies in these and adjoining states was considerably reduced from that reported in 1948, it nevertheless identifies this section as having the highest rate of rabies infection.

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Preservation of Canned Foods for Human Consumption, with Antibiotics

Experiments with the antibiotic, subtilin, were recently described by Dr. A. A. Anderson, Western Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry, Albany, Calif., before the Society of American Bacteriologists. Vegetables and other foods containing proteins have been successfully preserved by mild heat and the addition of 20 parts of subtilin per million of canned products. Subtilin is effective against spore-forming, heat-resisting bacteria that are responsible for spoilage of canned foods. These include the organisms that cause botulism in man.

The advantage, of course, is that such canned foods, since physical characteristics are only slightly changed by the cooking, are more attractive to the consumer. Though it is

reported that this antibiotic is destroyed by digestive enzymes, research into its effect on the normal bacterial flora of the digestive tract has not been exhausted.

The chance exists that this procedure might backfire if used. Those engaged in this work must prevision the possible effects of continuous intake of this agent. Potential dangers to consumers lie in the suggestion of preservation of human food with antibiotics.

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A.V.M.A. Convention Plans and Program Complete

The opening session will be the only general meeting during the A.V.M.A. convention at Miami Beach, August 21-24. Sectional meetings will follow.

Officers of the six sections as now organized, have completed programs so that a comprehensive discussion will be presented of the progress made in veterinary medicine during the past year and the prospects for the coming year. The sectional meetings include those on general practice, research, public health, small animals, surgery and obstetrics, and poultry. The general session which usually marks the closing meeting of the convention, will be eliminated but not at the expense of accomplishing the purpose of presenting brief and concise discussions of today's veterinary problems.

Provisions this year, as formerly, are being made for group meetings and luncheons. Arrangements for the official post-convention trip to Havana, Cuba, are described in detail in the tour folder now being mailed to members. A choice of travel by plane or boat is offered.

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Veterinary Schools at Georgia and Missouri Approved

The A.V.M.A. Council of Education has announced probationary approval for the ensuing year of the School of Veterinary Medicine, University of Georgia, Athens, and the School of Veterinary Medicine, University of Missouri, Columbia. Both of these institutions have graduating classes this spring.

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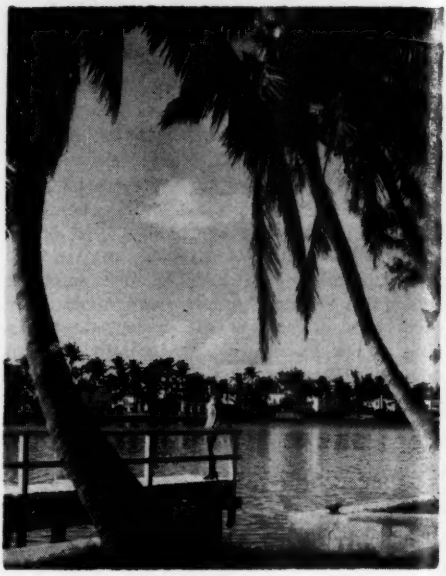
Work and observation in the field must continue to supply evidence on which conclusions can be accurately based as to the storage qualities of vitamins in mixed feed.

A.V.M.A., Miami Beach Convention August 21-24, 1950



Lacy palms etch the skyline all along Indian Creek Waterway, which winds through 30-odd islands that make up the City of Miami Beach.

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A New Breed of Auto-sexing Chickens

Poultryman Clarence E. Colby reports (*Poul. Ind.*, Jan. 1950) success in production of a new breed of chickens similar in size and type to the Barred Plymouth Rocks, New Hampshire and Rhode Island Reds used in producing it. Male chicks from this new breed, named Arbetters, are cream-color; females are buff. Sexing is thus simplified.

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Intercotyledonary mucous membrane of the bovine uterus may serve as maternal placenta and for fetal nourishment in the absence of some cotyledonous areas damaged or lost by infection following previous parturition.—*M. M. McLeod, D.V.M.*

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Awareness of infection may be responsible for the apparent increase in the incidence of heartworm infection in dogs.

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Painful swellings resulting from bee stings may be relieved by antihistamines.

Proposed Changes in Government Beef Grading

The Production and Marketing Administration, USDA, has proposed revision of federal grade standards for beef. Under the changes proposed, the present "prime" and "choice" grades would be combined under the classification of "prime," the present "good" would be renamed, "choice," and the new grade, "good," would include that now graded "commercial."

These proposals would broaden the range and make possible the inclusion of all young, good-eating beef in classifications which would carry the connotation of quality to the consumer.

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Retirement Waiver Requested for Dr. E. E. Wegner and Dr. John E. McCoy

Veterinary student body of the College of Veterinary Medicine, State College of Washington, Pullman, has petitioned the Board of Regents to allow Dr. E. E. Wegner and Dr. John E. McCoy to continue their respective teaching assignments, if they so desire. Doctor Wegner, who has served at the school for 41 years, 28 of them as dean, is scheduled to retire under the college's retirement rule, this year and Doctor McCoy next year.

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Contrast Between Vaccination and Prevaccination Periods

In 1948, not a single case of smallpox occurred in Illinois and there has not been a death in that state from that disease in a decade. Around 50 years ago, the deaths numbered 250 yearly. In a smallpox epidemic in Chicago in 1880-82, there were 6,835 cases, and in an epidemic in 1895, there were 3,754 cases reported.

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Dr. A. H. Groth, Dean at Missouri School

The Board of Curators of Missouri University has announced deanship of the School of Veterinary Medicine for Dr. Aaron H. Groth who has served as director at that institution since his appointment last September.

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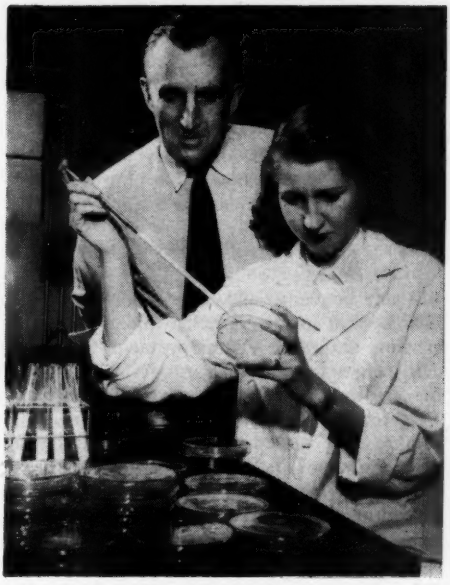
Solutions of antihistamines are not recommended for small animals because of overstimulation and toxic effects following their use.—*L. E. Harris, Lincoln, Neb.*

Program for Brucellosis Control in Wisconsin

A new laboratory on the University of Wisconsin campus is the center of activity for brucellosis control and eradication in that state, which has expanded sevenfold since 1945. Legislative appropriation of $1,500,000. for an area plan of control by vaccination, testing, and limited slaughter, with indemnity, are contributing efforts to reduce losses to



Dr. C. A. Brandly, director, and Mrs. June Eberts, bacteriologist, University of Wisconsin. Brucella Control Laboratory.

dairymen, estimated at $8,000,000. annually; losses which can be directly attributed to brucellosis. Dr. C. A. Brandly, chairman, Department of Veterinary Science, University of Wisconsin, Madison, heads the project committee. Cooperating bodies in the state-wide program of research and control are the State Laboratory of Hygiene, Wisconsin Board of Health, U. S. Public Health Service, and the Wisconsin Department of Agriculture. By legislative action, $50,000. a year has been earmarked for research.

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Nils Lagerhöf, V.M.D., Professor of Obstetrics and Gynecology, Royal Veterinary College, Stockholm, Sweden, is touring the United States. He is scheduled as guest speaker at the meeting of the American Society for the Study of Sterility to be held in San Francisco, Calif., June 24-25, 1950.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

At pig farrowing time, quite a good many reports are received about sows that have as many as half the teats turned in or inverted. The ends of the teats are grown in a reverse manner into the mammae. The result is, if there are large litters, that several of the pigs receive insufficient nourishment and may even die of slow starvation unless fed by hand. We know of no treatment for teat inversion. Since the condition is doubtless due to a genetic factor, our recommendation is to dispose of the sow and all of her offspring when they are marketable. To retain any for future breeding purposes is to invite financial loss.

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From conversations with veterinarians we surmise that in their practices the question regarding the value of thyroprotein feeding to dairy cows frequently is raised. At this time the evidence is not conclusive. However, the 1949 report of the chief of the Bureau of Dairy Industry, U. S. Department of Agriculture, indicates that in first-lactation heifers there was a sustained increase in milk production when thyroprotein and 25% more feed than they normally required, was fed. During the second, third and fourth lactations, on the same feeding schedule as the heifers, there was a progressive decrease in milk production on a mature-equivalent basis.

Up to the time of the report there was no evidence that the service-per-conception rate was affected by the thyroprotein feeding.

For the age from birth to 90 days, the death rate was 41% among 22 calves from the thyroprotein cows, as compared to a 24% death rate in the calves from cows that received no thyroprotein.

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Poultry management practices, which have allowed accumulation of litter with subsequent increase in liberation of ammonia, appear to contribute to keratoconjunctivitis, according to workers at the University of Massachusetts (*Poul. Sci.*, May 1950). The disease condition is characterized by marked photophobia and evidence of ocular irritation. A prominent lesion is an erosion on the surface of the cornea. Affected adults lose weight rapidly; growth is retarded in young birds.

Riboflavin in the control or, rather, prevention of periodic ophthalmia continues to receive favorable mention. Its action seems to be a purely preventive one and not in any sense curative. Reports available to this writer indicate that in those groups of horses in which the malady is present, no additional cases developed following the use of riboflavin. At the Army Remount Station at Front Royal, Va., 40 gm. of crystalline riboflavin were thoroughly mixed with a small amount of bran and this, in turn, blended with 1,000 pounds of bran. One pound of this medicated bran is the daily dose, the equivalent of 40 gm. daily. Stallions and brood mares frequently were given a double dose of the treated bran. If the animal is on an oats ration of ten pounds daily, 4 gm. of riboflavin, or if there is a five-pound daily allowance of a grain mixture, 8 gm., are added to 1,000 pounds of feed. If the horses are on good legume-rich pasture, the riboflavin treatment is discontinued during this time, and resumed when the pasture becomes inadequate.

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A practitioner visiting our office to pass the time of day, incidentally stated that he was on his way to examine a cow four days fresh and now unable to arise though otherwise, at least so the owner had told him, apparently in fair health. In answer to our inquiry as to his probable diagnosis we were informed that he could foresee any one of several conditions; *i.e.*, pressure paralysis of the obturator nerve due to the passing fetus; fracture of the ischiopubic symphysis; sub-acute parturient paresis; ketosis; and general calcium or phosphorus imbalance. We have not seen him since he has examined his patient; we are curious as to what he found.

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In the March 1950 number of *Country Gentleman*, there appears a well prepared article under the caption Let's Wipe Out Hog Cholera. Three main points are stressed: "(a) Sick hogs would have to be made 'reportable'; (b) eliminating the now promiscuous and careless use of virus on the farm as an immunizing agent; (c) controlling the handling and feeding of garbage." If you have not read the entire article we recommend that you do so.

VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.
Beltsville, Maryland

Sanitation, Diet, and Medication in Coccidiosis

A report from the Rhode Island Agricultural Experiment Station, entitled, Medication *versus* Sanitation in the Control of Coccidiosis, (*Poul. Sci.*, 28:686, 1949), deals with three common measures of controverted value in the control of cecal coccidiosis; namely, the frequent removal of litter, high-energy rations, and preventive medication (sulfaquinoxaline, 0.0125% in feed for ten weeks). The possible combinations of these measures were tested simultaneously on ten comparable groups of birds randomly selected from a lot of 1,764 day-old chicks. Over a period of ten weeks, data were obtained on mortality, weight gain, and efficiency of feed conversion.

Medication was the only factor that was correlated with marked reductions in mortality. Moreover, because of the design of the experiments, this factor contributed materially to the good, over-all results with the high-energy ration. It is, perhaps, noteworthy that the regimen of continuous medication caused no adverse effects on weight gains or feed conversion.

The groups of birds on high-energy feed appeared to have, on that account, a somewhat lower mortality from coccidiosis. As might be expected, they also showed better growth than those on the basal ration, and more efficient feed conversion.

Complete removal of litter every seven days appeared to afford a slight but probably significant advantage in all three respects (mortality, weight gain, and feed utilization) to the high-energy ration-untreated group as compared with controls. However, this measure seemed generally to be of little practical value, comparatively speaking, especially since any apparent advantage therefrom must be weighed against increased cost of labor and litter. In fact, cleaning *per se*, in the absence of drugs and with the chicks on a basal ration, was of no advantage in the specific tests conducted.

Although the birds in these tests were reared under natural conditions that permitted exposure to coccidiosis in all groups, the findings suggest that medication is the best measure for reducing losses and that high-energy rations produce the most economical gains.

Sodium Fluoride in Equine Ascariasis

Although carbon disulfide has long been recognized as somewhat short of an ideal drug for the removal of roundworms from horses, few research projects have been directed toward the development of a better treatment. Despite the need, moreover, the few treatments that have been suggested from time to time appear to have been passed over without further careful examination. Sodium fluoride is the most recent drug that has been found to have promise. It is especially noteworthy, not only because the reports are encouraging, but also because the excellent action of sodium fluoride against ascarids in swine might lead to premature risks of the drug in horses. The data are insufficient to warrant general approval of the treatment for horses.

Preliminary trials on seven horses by workers in the United States BAI suggested that the chemical in question had "some anthelmintic action against ascarids and oxyurids in horses." The tests were designed chiefly to throw light on the toxicity of the chemical, and only four of the animals harbored ascarids. Doses of approximately 3 to 5 gm. per cwt., given in feed or in capsules and as single or divided doses, removed all of these parasites. A recent study at the Kentucky Agricultural Experiment Station reports critical tests on 20 horses, including sucklings, weanlings, and yearlings, to which the chemical was administered in aqueous solution by stomach tube without preparatory fasting. Although the results are somewhat complicated by early autopsy of the animals after treatment (24 hours), doses of 2.5 gm. per cwt., removed 99% (1,154) of 1,156 ascarids from ten animals, and doses of 1.5 gm. per cwt., removed 96% (798) of 824 ascarids from nine animals. At this lower dose rate, however, the chemical was notably ineffective in one heavily parasitized animal, not included in the aforementioned calculation. The medication was effective against immature as well as mature ascarids. Moderate gastritis or enteritis, soft feces or diarrhea, hemoconcentration, leukocytosis, and hemolysis were noted after treatment, but the effects were transient and not regarded as contraindications to the medication.

POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

Two articles on the use of drugs for control of histomoniasis (blackhead) of turkeys by Sautter, Pomeroy and Roepke (*Am. Jour. Vet. Res.*, 11:115, 1950) give procedures for screening and testing such drugs and the results obtained by the use of several drugs on experimentally produced cases of the disease. An efficient method for producing the disease consists of rectal injection of minced liver tissue of infected poults. Such infected poults were found to be satisfactory for screening the various drugs.

Stovarsol, tryparsamide and vioform were ineffective for treatment of the disease in advanced stages. They appeared to be effective in the order given in reducing mortality if administered in the early stages of the disease. Sulfaquinoxaline and iodine vermicide afforded slight protection. Sulfamerazine, sulfaguanidine, and streptomycin, anthiomaline, dimidium bromide, pentamidine, sodium fluoride, Eagle's compound, and neoarsphenamine did not appear to show any therapeutic value by the methods used.

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A good way for a poultryman or turkey-grower to buy a disease is to purchase "started" chicks or poults. Urge your client to purchase only day-old chicks or poults from reliable hatcheries which sell only stock from pullorum disease-free flocks, to insure himself against the purchase of such diseases as coccidiosis, Newcastle disease and salmonellosis, along with the started birds. Started chicks or poults often suffer heavy mortality from diseases contracted before they leave the hatchery. They also may be the source of a new disease which has not previously existed on a farm. A campaign against the practice of hatcherymen selling started birds of any species should be part of a poultry disease prevention program. You should also include in such a program, a warning about the disease transmission dangers of buying any age of birds for replacements. A common procedure, which should be stopped, is the purchase of adult males for breeding flocks. A much better method is for the grower to buy day-old chicks or poults from the breeding farm and raise his own males for replacements. It is also the only safe method of replacing the laying flock.

Probably the most important mechanical carrier of disease from one poultry farm to another is man himself. He may be a visitor, a blood tester, feed dealer, an official culler, a chick sexer, a flock inspector, or any one of the numerous individuals that serve the modern poultryman. The veterinarian is included in this list, and he should set an example to all others by using extreme care against carrying infection from one farm to another. Such simple precautions as the use of rubbers, which can be cleaned easily and disinfected between farms, and the use of rubber outer garments that can be cleansed readily are examples. A rubber or plastic apron is often sufficient as an outer garment. Before leaving a poultry farm, such items should be removed and cleaned in view of the poultryman, to impress him that precautions are being taken. There is no need to go into further detail concerning other sanitary precautions because they are the same as used for handling contagious diseases of all animals.

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Under a new regulation of the U. S. Post Office Department, shipments of day-old chicks, ducks, geese, guinea fowl and turkeys will be accepted for shipment via parcel post only when delivery to the addressee can be effected within 60 hours from the time of hatching. Previously, regulations allowed up to 72 hours.

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A rapid, whole blood agglutination test for detection of carriers of avian tuberculosis has been developed by Karlson, Zinober and Feldman (*Am. Jour. Vet. Res.*, 11:137, 1950). The test is conducted by a procedure similar to that used for detection of pullorum disease, and the two tests can be conducted at the same time. The preliminary results reported by these investigators indicate that the new test will prove an efficient means of detecting infected flocks.

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There are three principal methods used in sexing baby chicks; sex-linked cross-bred matings, auto-sexing breeds or varieties, and the cloacal or so-called Japanese method of examination of the copulatory organ (Taylor, L. W., *Calif. Agri.*, 3:6 [Nov.], 1949).

ABSTRACTS OF LITERATURE

Toxic Substances in Helminths and Their Disease-Causing Action

The excretions of helminths are of two kinds[25]; allergy-causing substances which belong to the proteins and always produce eosinophilia, or toxic substances capable of producing acute or chronic intoxications, which are comparable to histamine poisoning in their biological reactions. The chronic cases are characterized by inflamed edematous infiltrations and necrobiotic processes, particularly in the lungs, kidneys, and liver. Often plastic anemia can be observed also. These toxic substances belong to the polypeptides and are different from histamine. The new findings open the way for research work dealing with the possibility of developing an antitoxic therapy for acute diseases due to infestation with worm parasites.—R.S.

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Improved Method for the Determination of Parasite Eggs in Feces

Three research workers at the Veterinary State Institute of Oldenburg, Germany,[26] developed a simplified and speedy method for the determination of ova of intestinal parasites, making it possible to investigate large numbers of feces samples simultaneously. Each feces sample is diluted in the normal manner and poured through a sieve into a Petri dish with a level bottom. After ten minutes, the supernatant liquid is carefully poured off, then three drops of a 2% aqueous eosin solution are added and evenly distributed over the surface of the bottom of the Petri dish. Under the microscope, (preferably using daylight), the ova of parasites are observed to be fluorescent green, showing clearly their structure. All plant materials and the underground are red. The eggs of various parasites have distinct shades of green, *e.g.*, ova of liver flukes, yellowish green with green border; nematodes, light green; strongyloids, only the embryo is colored green; tapeworms, uniformly green; etc. The contrasts can be brought out even better by the use of blue filters. The new technic may also be used with feces samples which have been preserved with 10% formaldehyde solution.—G.L.

[25]Deschiens, A., Toxic Substances of Helminths: Their Pathogenetic Power and Their Identification. *Die Veterinärmed*, 1:317, 1948; *Ann. de l'Inst. Pasteur*, 7:397, 1948.

[26]Pusch, J., Senne, I., and Beyer, W., An Improved, Simple Method for the Identification of Parasite Eggs in Fecal Samples. *Tierärztl. Umschau*, 5:54, 1950.

New Pregnancy Test for Mares

A biological test for the diagnosis of pregnancy in mares, between the 42nd and 120th day of the gestation period, is based on the identification of a gonadotropic hormone in blood[27]. The results are very definite and the possibilities of misinterpretation practically can be excluded. The test is made with mature male frogs or, even better, with toads (*Bufo arenarum, Rana pipiens, etc.*) preferably of approximately 100 gm. (3½ oz.) body weight.

Two or more experimental animals are needed for one test. Each animal receives two injections, consisting of 6 cc. of plasma or serum, administered into each of its two adjacent lymph bags. The reading is taken after three and six hours and, if not positive at this time, after 24 hours. During the test, the animals are kept in a glass container (with water on the floor) at a temperature above 20 C. to 25 C. At the given time, the test animal is taken from the glass container and its cloacal opening dried right away. Then, through pressure, up to 5 cc. urine is produced and collected on glass. Even a pocket microscope shows clearly the very motile sperms, if the test is positive. The test animals may be used again after a week if the test is positive, but after only three days if it is negative.—G.L.

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Interruption of Broodiness in Hens

Subcutaneous injections of 2 cc. of stilbestrol (30 mg.) in sesame oil resulted in discontinuance of broodiness in 113 of 115 hens,[30] most of which were in their first laying year.

Estrogenic interruption of broodiness was as effective as the ordinary coop method employed on birds selected showing symptoms of persistent sitting on the nest and associated behavior of broody hens. No significant variations were noted in the elapsed time between broodiness and return to laying or the rate of lay.

The suggestion is made that induced elevation of the estrogenic level may have interrupted broodiness by a general suppression of the hormonal secretion from the anterior lobe of the pituitary gland.

[27]Brazel, Erich, New, Fast Diagnosis of Early Pregnancy in Mares. *Deutsch. Tierärztl. Wochensch.* 57:62, 1950.

[30]Godfrey, Edward F., and Jaap, R. George, Estrogenic Interruption of Broodiness in the Domestic Fowl. *Poul. Sci.*, 29:356 (May), 1950.

Stimulation of Lactation through Estrogenic Substances

Aqueous hormone suspensions[28] can be used to start lactation in ruminants. The single dose recommended for cattle is 1 gm. of estradiol esters of dienestrol diacetate; it takes a few weeks for the dose to be resorbed. The treatment is suggested for sterile heifers and sterile, dry, or almost dry cows. Cows up to 14 years of age responded satisfactorily to this treatment. • • •

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Treatment of Infectious Sinusitis in Turkeys

For several years, the standard method of treatment employed was to instill into the affected sinus 1 cc. of a freshly prepared, 4% solution of silver nitrate, after aspiration of the exudate. The silver nitrate solution was gently massaged into the tissues and in most instances this resulted in complete recovery in about ten days. Occasionally, a second treatment was necessary.

Recently, Hitchner reported on the value of penicillin and streptomycin[29] in the treatment of infectious sinusitis. Penicillin did not prove effective. However, the injection of streptomycin into the swollen sinuses without removing the exudate resulted in a complete recession of the swelling within a week to ten days.

Glover treated 78 birds with injections of streptomycin. Dosage used was that suggested by Hitchner, 150 mg. in 0.6 cc. of sterile distilled water. The exudate was not removed from the sinuses. Thirteen days later, the majority of the sinuses that had been injected appeared normal. New cases were treated and two weeks later it was reported that all birds in the treated pens appeared normal.

Transmissibility of infectious sinusitis has been known for several years. Jungherr refers to several investigators, himself included, who have, during the past few years, isolated from infected turkeys an agent which was capable of producing the disease in susceptible birds.

The disease more closely resembles those caused by Rickettsia. The fact that the infection is successfully treated by injections of streptomycin tends to support the rickettsial view.

[28]Hohlweg, Walter, About the Problem of Initiation of Lactation by Means of Estrogenic Substances. *Monatshefte für prakt. Tierheilkunde*, 1:165, 1949.

[29]Glover, J. S., Report of Treatment of Infectious Sinusitis in Turkeys with Streptomycin. *Can. Jour. Comp. Med.*, 14:166 (Apr.), 1950.

Pustular Dermatitis in Baby Pigs

Baby pigs often suffer from a specific skin disease characterized by pustules[31] at the snout and around the eyes. In progressive infections, these lesions soon cover the entire surface of the body, finally forming brownish-black crusts. Nursing sows develop a few pustules on the udder.

Successful treatment consists of washing the pigs with a 1:1,000 solution of acriflavine; difficult cases should be treated with more concentrated solutions.—G. L.

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Use of Curare in Tetanus

Curare, by its action at the myoneural junction, blocking the transmission of nerve impulses, has proved useful in the management of tetanus in man by effective control of associated painful muscular contractions[31]. Muscular relaxation in one case was marked after use of the drug, pointing to the danger of paralysis of the muscles of respiration. Neostigmine and physostigmine are physiological antagonists to curare and act immediately to relieve respiratory paralysis caused by it. Whether or not treatment with this drug will lower the mortality rate in tetanus in animals remains for clinical trial.

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R48 in Leukemia

Following observations of the effect on the leukocyte count after intravenous administration of nitrogen mustard, work on a related compound, commonly referred to as R48, is reported[32]. Seventeen human patients were given 300 mg. to 400 mg. daily *per os*. Remission of symptoms was effected in two of three cases of chronic lymphatic leukemia. There was recorded an invariable depression of the leukocyte count.

Toxic symptoms include relatively mild and infrequent gastric disturbances. The drug is believed to show some promise in the treatment of these conditions.

[31]Hendrikx, H., Baby Pig Diseases. *Die Veterinärmed*, 2:32, 1949; *Vlaams Diergeneesk. Tschr.*, 18:19, 1949.

[31]Ory, Edwin M., M. D., and Grossman, Laurence A., M. D., The Management of Tetanus with Curare: Report of Two Cases. *Am. Jour. Med. Sci.*, 215:448 (Apr.), 1948.

[32]Matthews, W. B., M. R. C. P., A Trial of B-naphthyldi-2-chloroethylamine (R48) in Leukemia, Hodgkin's Disease, and Allied Diseases. *Lancet*, 258:896 (May 13), 1950.

BOOK REVIEWS

DISEASES OF THE PIG AND ITS HUSBANDRY, by *David J. Anthony, M.R.C.V.S., D.V.S.M.* (Vict.), F.R. San I. Third edition. 309 pages, 53 illustrations, cloth bound. The Williams & Wilkins Company, Baltimore, Md., American publishers, 1950.—Price $4.00.

The fact that a third edition of this book has been called for so soon after the second attests the popularity of the text among those for whom it was prepared, namely, in this English author's words, "the veterinary surgeon, the agriculturist, and the cottager."

The first five chapters (76 pages) deal with matters of husbandry, including housing and feeding. Subsequent text material includes discussions of classified diseases, and chapters on parasites, poisonous plants and postmortem methods.

In all, discussions have been generally prepared to be understandable by non-professional readers. Veterinarians in this country will hardly find useful those parts of the text dealing with hog cholera, swine erysipelas, and some other conditions frequently affecting swine herds in this country. In others, useful information is given that will serve as reference material.

Chapter on poisons and poisonous plants is well prepared and exhaustive. Literature references include a review of some American works.

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PUBLIC HEALTH AND HYGIENE: A STUDENT'S MANUAL, by *Charles F. Boldnan,* M.D., formerly Director, Bureau of Health Education, City of New York, Department of Health, and *Nils W. Boldnan,* M.D., Chief, Pediatric Service, St. Francis Hospital, Santa Barbara, Calif. Fourth edition. 423 pages, with 83 figures. W. B. Saunders & Co., Philadelphia, Pa., publishers, 1949.—Price $4.25.

In an endeavor to maintain this excellent manual as a reliable guide to current public health knowledge, organization, and practice, the authors have thoroughly revised text material of previous editions and added much new material. These revisions and additions are made necessary by the rapidly changing conditions and understanding of public health problems.

The field of public health and preventive medicine as a social science is youthful, yet has roots which extend far into antiquity. The efforts to ease lives and to prevent or ameliorate human suffering is its prime objective and always finds sympathetic reception by the public. This is particularly true when evidences of disease are crowded upon large segments of the population. The activity of veterinarians in public health work, though not given the emphasis in this regard it deserves, is apparant in consideration of work in meat and milk inspection and tuberculosis and brucellosis eradication, only to start a list. Now, those having formal training in veterinary medicine are being urged to join the forces of human medicine in the programs outlined by public health organizations.

The contents of this book are organized into five parts. The reader's interest is held by concise and clear discussions of a large number of communicable and non-communicable diseases, community hygiene, and health administration.

The work is commended for study.

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Bulletins — Circulars — Booklets

Toxaphene Residues.—Experimental feeding of toxaphene-treated alfalfa to cattle and sheep. Toxaphene in tissues of cattle and sheep fed toxaphene-treated alfalfa.—Technical Bulletin 461, Montana Agr. Exp. Sta., Bozeman.

Intestinal Worms in Sheep.—Includes a description of the parasites and means of control.—Montana Agr. Exp. Sta., Bozeman.

Control of Brucellosis in Range Cattle.—Reprint of a manuscript by Hadleigh March and H. F. Wilkins, Bozeman, Mont.

Ulcerative Dermatosis of Sheep.—Reprint of a manuscript by E. A. Tunnicliff, Bozeman, Mont.

Variable Susceptibility to Coccidiosis—Inherent and environmental factors account for measure of effectiveness of preventive agents. —Reprint *Mich. Agr. Exp. Sta. Quart. Bul.,* 32:364 (Feb.), 1950.

The Relationship between Semen Quality and Conception Rate in Artificial Insemination of Dairy Cattle—Research Bul. 447, Univ. Mo. Agr. Exp. Sta., Columbia.

VETERINARY ITEMS OF INTEREST

Modern chemotherapy is less than 50 years old, and half its life was confined to German laboratories.

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A mineral-enriched, cooked, lean meat formula has been found to be a good substitute for milk, in studies on rats by investigators at the University of Minnesota.

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Orchitis in the boar is frequently seen in Brucella-infected herds and may be responsible for spread of the infection.—*H. A. Garrett, D.V.M.*

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When an outbreak of foot-and-mouth disease occurs in Switzerland, the infected stock is destroyed and the contact stock vaccinated.

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Supplementing a ration with the animal protein factor does not supplant nor lessen the need for animal protein in the ration.

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Four hundred years ago the domestic cow of England was little larger than the Newfoundland dog.—*Jour. Agr. South Australia.*

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Cats do not tolerate catgut sutures in the muscles and subcutaneous tissue as well as do other animals.

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The number of dairy cows registered for artificial insemination approached the 3,000,000 mark in 1949. In this lies the implication that one cow in nine in the United States will be inseminated artificially in 1950.

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The heifer calf that develops normally, weighs 16 to 17 times as much as an adult, as she does when dropped. The mature bull weighs 22, and sometimes 23, times as much as he weighed when calved.

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Epidemiological studies of Q fever infections in southern California among dairy and other livestock workers and residents near dairies, have shown that factors other than the personal or household use of raw milk are required to explain these infections.—*Pub. Hlth. Repts.*, 65:541 (Apr. 21), 1950.

Warts may be spread by improperly cleansed and sterilized tattoo markers.

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Artificial insemination associations are now operating in 47 states and in Alaska.

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The abdominal wall of the cat is thin, and careful suturing is required in closing mid-line or ventral incisions.—*William F. Irwin, D.V.M., Tulsa, Okla.*

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The proof of a sire is in his get; not in the blue ribbons he may have won. Illogically his price depends far more upon the latter.

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There has been no rabies in England since 1922. In the last two years, eight cases have occurred in quarantine stations; all in dogs.

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In comparison under field conditions in Ohio, a bushel of corn (70 lb.), fed as corn and cob meal, gave 0.9 lb. more gain on steers in feed lots and pigs following, than did a bushel of shelled corn (56 lb.)

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Wastage is responsible for increasing greatly the cost of food production. Wasteful feeding, feeding unthrifty animals and loss of animals due to disease and carelessness, are three prime causes of waste in food production. Infections and parasites enter largely into the last two.

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The normal blood cell count in turkeys is reported by Wai and Stafseth to average 2,600,000 erythrocytes and 12,000 leukocytes per cubic millimeter.—*Poul. Sci.*, May 1950.

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During a survey of the incidence of Q fever in California, meat inspectors in 23 establishments where animals are slaughtered, submitted 10,179 test samples, of which 306 reacted positively.

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Preliminary experiments conducted at the Cincinnati Children's Hospital indicate the possible presence of protective substances against poliomyelitis in milk. Mice injected with a mixture of live virus and human milk survived, while those injected with virus alone developed paralysis. The substance has also been detected in milk from individual cows.

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infectious diarrhea
enteritis in calves

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